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ABSTRACT

This document contains the following papers on Web-based education systems in Europe: (1) "European Experiences with Learning Management Systems" (Morten Flate Paulsen and Desmond Keegan); (2) "Online Education Systems: Definition of Terms" (Morten Flate Paulsen); (3) "Learning Management Systems (LMS) Used in Southern Europe" (Ana Dias, Paulo Dias, Pedro Pimenta); (4) "The Use of Learning Management Systems in North Western Europe" (Desmond Keegan); (5) "The Use of Learning Management Systems in Germany" (Helmut Fritsch, Holger Follmer); (6) "An Analysis of Online Education and Learning Management Systems in the Nordic Countries" (Morten Flate Paulsen); (7) "The ABCs of E-Learning: The Use of Learning Management Systems in the Czech Republic and Slovakia" (Maria Micincova); and (8) "Stand Ready? Emerging E-Learning Standards in a Pedagogical Perspective" (Gro-Anett Olsen). (MES)

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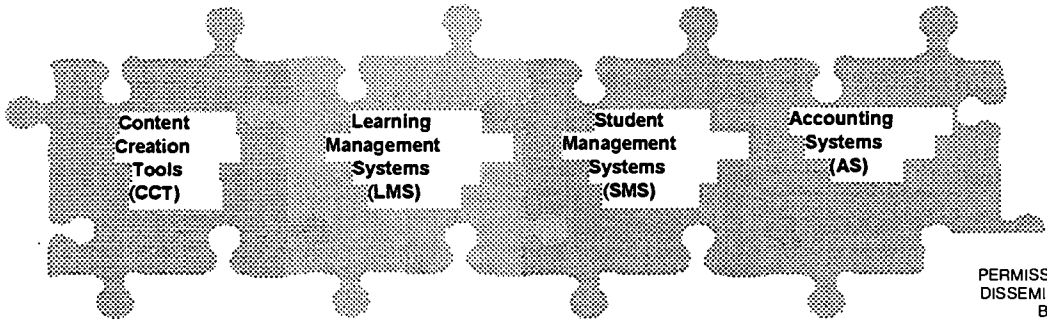
Web-Education Systems in Europe



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European Experiences with Learning Management Systems

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Abstract

This article presents the major findings from a meta-analysis of six regional analyses conducted within the framework of the European Commission Web-edu project (http://www.nettskolen.com/in_english/webedusite/index.html). It analyses the satisfaction, or lack of satisfaction, of European institutions with the e-Learning Learning Management Systems (LMSs) that they have purchased or developed themselves. Data was collected from in-depth interviews with 113 European experts, usually the e-Learning systems managers in the institutions, in 17 countries. The analyses of the interviews revealed as many as 52 different commercial and 35 self-developed LMS systems. The article presents the data from these interviews and includes a series of far-reaching conclusions from the study. A striking conclusion of this study is that the generally accepted position that the market is dominated by the American LMSs, is not the norm throughout Europe. In the countries that not use English as their first language, locally developed LMS systems have successfully repelled the American products. A remarkable large number of the LMS systems used in Europe are commercial systems developed locally or self-developed systems at the institutions.

Introduction

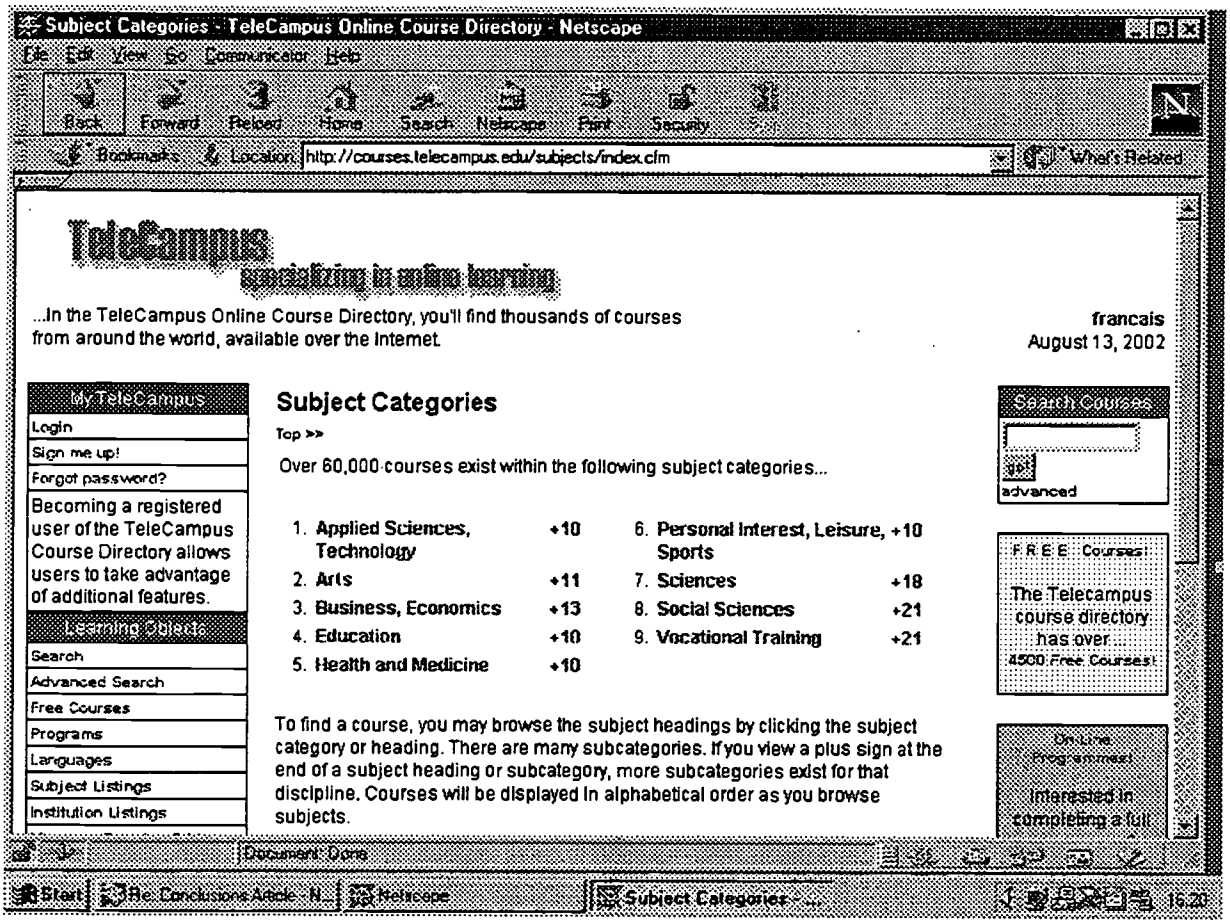
There is now little doubt that the World Wide Web is the most successful educational tool to have appeared in a long time. It combines and integrates text, audio and video with interaction amongst participants. It can be used on a global scale and is platform independent. While largely an asynchronous medium, it can also be used for synchronous events. It is not surprising therefore, that trainers, lecturers, distance education providers, and teaching institutions at all levels are increasingly using the World Wide Web as a medium for course provision (Mason 1998).

Education and training on the World Wide Web is generally referred to as e-Learning. In the last few years it has spread worldwide and is now a recognised sector of education and training provision. It is an electronic form of distance learning and is available, in addition, to on-campus students who can use e-Learning provision to supplement their lectures and sessions in the computing laboratory.

Today e-Learning is widely used in corporate training and international and multinational corporations claim to have made vast savings in training costs by switching much of their training to the WWW. Nationally and internationally recognised university degrees, college diplomas and training certification are now available by e-Learning. E-Learning companies, like Riverdeep and SmartForce are quoted on the New York Nasdaq Exchange, and the major providers of Learning Management Systems, like WebCT and Blackboard, are major US

corporations. Few universities in the English-speaking world do not provide e-Learning courses and the penetration of this provision into Europe is a growing phenomenon.

Evidence of the world wide spread of e-Learning in recent years is easy to obtain. No fewer than 70.000 courses are listed on the TeleCampus portal from TeleEducation, New Brunswick, Canada (http://www.courses.telecampus.edu) with URLs for each course that makes it easy for prospective students to study course summaries with a view to enrolling. In spite of the competence of the TeleEducation database, most of the courses are from the United States and Canada, and it is unlikely that many, or any, of the provision of the 113 institutions studied in this report is listed by their portal.



Much of the world wide success of e-Learning can be attributed to the availability of Learning Management systems (LMSs), also known as Virtual Learning Environments (VLEs) or learning platforms. An LMS enables an institution to develop electronic learning materials for students, to offer these courses electronically to students, to test and evaluate the students electronically, and to generate electronically student databases in which student results and progress can be charted.

The authoritative *Observatory on Borderless Higher Education* (2002) comments:

> Recent years have witnessed remarkable growth in use of learning platforms in higher education around the world. Following longstanding computerisation in research and administration, learning platforms have brought information technology closer to the core of the higher education experience- teaching and learning.

Learning platforms offer enhanced student access to learning materials, straightforward integration of digital content and a range of student interaction and tracking services. Different systems have different emphases, but common features include content authoring tools, calendars, syllabi, discussion boards and assessment mechanisms.

Terminology in this territory is often loose and poorly defined. Learning management systems, content management systems, learning platforms and portals are just some of the most common terms used to describe a range of teaching, learning and administrative software. The lines between learning platforms and other administrative software are increasingly blurred, as vendors seek to provide comprehensive solutions, either alone or in partnership with specialist firms.

Learning platforms have also blurred the lines between campus-based higher education and distance learning, offering campus-based students the flexibility to access provision outside the traditional classroom. Many leading learning platforms grew out of small-scale developments in universities. Some higher education institutions continue to develop in-house systems or buy into open source alternatives, but an ever-larger majority are purchasing licenses for proprietary platforms. Indeed, two vendors, Blackboard and WebCT currently dominate the market, not only in their native North America, but internationally. Yet both have been trading for little more than five years.

Brandon-hall.com defines an LMS as: "software that automates the administration of training events. An LMS registers users, tracks courses in a catalogue, and records data from learners; it also provides reports to management. An LMS is typically designed to handle courses by multiple publishers and multiple providers."

The focus of the European Commission Web-edu project is, therefore, on the satisfaction, or lack of satisfaction, that European institutions have with the LMSs that they have purchased or developed themselves. This is a timely analysis because in the English-speaking world the e-Learning industry is dominated by the major American LMS providers. This is in spite of the fact that a number of these, like Web CT, was developed by Murray Goldberg at the University of British Columbia in Vancouver, Canada and then sold to an American company in Pennsylvania, whereas TopClass originated as a European Commission project at University College Dublin, in Ireland, before becoming an Irish campus company and then migrating to the United States.

A striking conclusion of this study is that this generally accepted position that the market is dominated by the major American LMSs, is not the norm throughout Europe. In countries that not use English as their first language, locally developed LMSs, in native languages, have successfully repelled the American products.

The Web-edu project regards e-Learning as an electronic form of distance learning and therefore concentrates on those sub-systems of a viable learning environment that characterise distance learning:

- Course development tools
- Student support tools
- Tutor support tools
- Administration
- Technology
- Financial issues.

Data presentation

This article represents a meta-analysis of six regional analyses conducted within the framework of the European Commission Web-edu project

(http://www.nettskolen.com/in_english/webedusite/index.html). It is based on the regional analyses listed in Table 1.

Table 1. List of regional analyses

Regions	References to regional analyses	Number of institutions
North Western Europe	Keegan 2002	18
The Nordic Countries	Paulsen 2002	20
Norwegian Universities and Colleges	Runnestø and Ristesund 2002	24
Germany	Fritsch and Föllmer 2002	17
Southern Europe	Dias, Dias, and Pimenta 2002	20
The Czech Republic and Slovakia	Mičincová 2002	14
Total		113

All regional analyses are based on in-depth interviews with systems managers or systems experts at the user institutions. The interviews were conducted in the Fall of 2001 and Spring of 2002 as face-to-face meetings, telephone interviews, or e-mail interviews. All interviews were based on a common interview guide.

The researchers had no intentions of selecting interviewees that constituted a representative selection of European system managers for LMS systems. Data is provided for Norway, which virtually includes all the universities and colleges in that country, but it was not a goal of the project that every European country be included in the project or that every institution in a country could be covered. However, it is considered that the total of 113 institutions and the spread to 17 European countries gives an adequate database for far-reaching conclusions on the satisfaction of European institutions with the LMSs they have developed or purchased.

The researchers were encouraged to find interviewees in various types of institutions. The experiences showed that it could be hard work to find interviewees that both were competent and willing to take the necessary time to participate.

Table 2. The types of institutions. Sorted by total number of institutions

Type of institution	North Western Europe	The Nordic Countries	Southern Europe	The Czech Republic and Slovakia	Germany	Norwegian Universities and Colleges	Total
Universities	4	8	10	8	7	1	38
Colleges of higher and further education	7				2	20	29
Private companies		1	3	2	6		12
Distance education institutions		3		2	1	3	9
Non-Profit Institutions (training)			6	1	1		8
Institutes of Technology	5						5
Primary and secondary schools		3					3
University centres		1		1			2
Training organizations	1	1					2
Consortia		2					2
Government training agencies	1						1
Commercial provider of LMS related services		1					1
Anonymous			1				1
Total	18	20	20	14	17	24	113

Table 2 lists the types of institutions in the study. Many of the institutions are universities, institutes of technology and colleges of further and higher education. Other types of institutions are more or less underrepresented. This reflects the willingness of university or company e-Learning systems managers to co-operate in the study.

Data is tabulated from the study for the following:

- List of regional analyses (Table 1)
- Types of institutions in the study (Table 2)
- List of 17 countries in the study with demographical data (Table 3)
- Percentage of institutions with more than 50 online courses (Table 4)
- Distribution of institutions per number of courses (Table 5)
- Commercial LMSs in the analyses (Table 6)
- Self-developed systems (Table 7)

Important themes that emerged during the analyses and developed in the article are:

- Penetration of internet use and LMS systems
- Large scale providers
- Commercial LMS systems
- Regional preferences and market leaders
- Vendor specific issues
- Competitive issues
- Self-developed systems
- LMS functionality

- Knowledge, policy, and strategy
- E-learning standards
- Important findings from a European perspective.

Penetration of Internet Use and LMS Systems

Table 3 shows that 113 institutions from 17 countries in Europe were interviewed and gives the official languages, population and Internet penetration in the countries concerned. All of these are factors in the choice and selection of an LMS for e-Learning. The data presented are compiled from various sources used in the regional analyses. The primary sources are CIA World Factbook 2002 and Eurostat 2002.

From this analysis we would like to emphasise the differences between the Internet use in Northern and Southern Europe. The Internet users range from 50% in the Nordic countries to 33% in North Western Europe, 30% in Germany, 18% in Southern Europe, and 10% in the Czech Republic.

Table 3. List of Countries in analyses, Official Languages, Inhabitants and Internet penetration. Sorted by Internet Users per 100 inhabitants.

Country	# of institutions interviewed	Language	Area in sq km	Inhabitants in millions	Internet hosts per 100 inh.	Internet users per 100 inh.
Sweden	5	Swedish	449 964	8.9	7.0	56.4
Norway	28	Norwegian	324 220	4.5	11.2	52.7
Finland	4	Finnish	337 030	5.2	13.6	44.5
Denmark	5	Danish	43 094	5.3	13	43.0
Great Britain	6	English	227 480	57.6		33.5
Northern Ireland	4	English	14 120	1.6		33.5
Germany	17	German	357 021	82.2	2.3	29.6
Ireland	8	English	70 280	3.8	2.3	27.5
Italy	6	Italian	301 230	57.8	2.7	23.3
France	4	French	547 030	59.5	1.7	16.9
Switzerland	1	German	41 290	7.2	4.4	24.0
Spain	1	Spanish	504 782	39.5	1.4	13.9
Slovakia	4	Slovak	48 845	5.4	0.7	12.1
Portugal	8	Portuguese	92 391	10.2	1.2	10.0
Czech Republic	10	Czech	78 866	10.3	1.6	9.7
Greece	1	Greek	131 940	10.6	1.0	9.5
Iceland	1	Icelandic				
Total of 17 countries	113	Total of 14 languages				

There are significant regional differences within Europe with regard to how far the institutions have come in their use of LMS systems. The differences seem to follow the regional statistics for Internet users, which means that the Southern Europe, the Czech Republic and Slovakia seems to be less mature with regard to use of LMS systems than the other regions.

The analyses for North Western Europe and the Nordic countries shows that these regions already have come far in their use of LMS systems:

> LMS systems seem to be widely used in Nordic higher, further, and continuing education. It is not easy to find Nordic institutions without experiences with LMS systems. (Paulsen 2002)

In the United Kingdom and Ireland there is a very extensive implementation of e-Learning via LMSs. This includes provision at degree and diploma level. It seems that very many universities and colleges have purchased an LMS, and many corporations too. (Keegan 2002)

The analyses for Southern Europe, the Czech Republic and Slovakia include the following statements, which indicate that these regions are less mature:

From the present research it is clear that the increasing number of Internet users in Southern Europe is pushing up the e-Learning market. There are more institutions, which have web presence and e-learning offerings. (Dias, Dias, and Pimenta 2002)

It is our conclusion from the present studies that Southern European institutions are on the right track to further develop their existing e-Learning offerings. (Dias, Dias, and Pimenta 2002)

Since the year 1998 we have observed the e-learning field evolution. Ana Dias (2000) wrote in the CISAER final report: The present study shows evidences of an evolution of the institutions involved in e-Learning in Southern Europe. The pilot projects are no longer dominating the e-Learning field in Southern Europe. But, the research also led us to observe that the most part of the e-Learning managers assume a position of experimentation and initiation on the e-Learning process (50% of the researched institutions have less then 15 courses online). (Dias, Dias, and Pimenta 2002)

The thrust in e-learning is not yet wide spread. General public opinion about online education is not always positive. The institutions are many times viewed as the ones implementing strange "things". In most cases online education is used as a help and addition to the traditional face-to-face education. However there are individual experiments and, as one institution stated, they would like to adjust their LMS in the way that it enables them to offer paid courses as a kind of lifelong education to the public. (Mičincová 2002)

9 from 14 interviewed institutions have not been using LMS longer then one year. That shows the very early start but the results after such a short time are already visible. The acceleration of this development must be considered. (Mičincová 2002)

In the Czech republic recently a nice co-operation in a project of building a virtual university has started among 3 universities (SBA in Karvina, University of Ostrava and FE). (Mičincová 2002)

Large-scale providers of e-learning

An important issue is the number of institutions that can be characterised as large-scale providers of e-Learning and those in which provision is, as yet, on a smaller basis:

> The analysis indicates that there is a clear trend towards large-scale online education in the Nordic countries. It shows that 12 of the 20 institutions offer at least 50 online courses. According to a 1998-99 analysis, (Paulsen 2000) only 3 of 22 surveyed Nordic institutions offered more than 50 online courses three years ago. Further, the interviewees talk about LMS systems as large-scale systems capable of handling thousands of users. (Paulsen 2002)

The first data analyses on large-scale providers, in which the provision of 50 or more courses online is considered to represent large-scale provision, is presented in Table 4.

Table 4. Percentage of institutions with more than 50 online courses sorted by percentage

Region	Reference to regional analyses	# institutions that offer at least 50 online courses	Percentage
The Nordic Countries	Paulsen 2002	12 out of 20	60
Germany	Fritsch and Föllmer 2002	7 out of 17	41
North Western Europe	Keegan 2002	6 out of 18	33
Southern Europe	Dias, Dias, and Pimenta 2002	5 out of 20	25
The Czech Republic and Slovakia	Mičincová 2002	0 out of 14	0
Total		30 out of 89	34

If one characterizes institutions that offer at least 50 online courses as large-scale providers of online education, 30 of the 89 institutions (34%) we have data from could be characterized as large-scale providers. The analyses indicate that the trend towards large-scale online education has come further in the Nordic countries (60%) than in the other regions.

Table 5. Distribution of institutions per number of courses

Number of courses	The Nordic Countries		Germany		North Western Europe		Southern Europe		The Czech Republic and Slovakia		Sum Web-edu analyses		CISAER analysis (Paulsen 2000)	
	%	#	%	#	%	#	%	#	%	#	%	#	%	#
1	0	0	0	0	6	1	10	2	7	1	4	4	23	30
2-4	5	1	18	3	11	2	10	2	14	2	11	10	23	30
5-15	10	2	24	4	22	4	33	7	21	3	22	20	22	28
16-99	35	7	35	6	17	3	38	8	36	5	32	29	22	28
100-	40	8	24	4	22	4	0	0	0	0	18	16	3	4
No Answer	10	2	0	0	22	4	10	2	21	3	12	11	8	10
Total	100	20	101	17	100	18	101	21	99	14	99	90	101	130

Table 5 compares the number of online courses found in this analysis with a previous international analysis of web-based education conducted in the CISAER-project (Paulsen 2000). This comparison indicates that there is a clear trend that institutions offer more online courses today than they did three years ago. One may say that the trend is to go from small-

scale to large-scale online education.

Commercial LMS Systems

Table 6 shows that the analyses revealed that the 113 institutions altogether had experiences with 52 different commercial systems. It is however important to observe that only a few systems are used by several institutions. The analyses indicates that the following systems are among the most used commercial LMS systems in Europe, since they were the only systems that five or more institutions had experiences with:

- BlackBoard (14 institutions)
- WebCT (20 institutions)
- FirstClass (7 institutions)
- TopClass (7 institutions)
- Lotus Learning Space (6 institutions)
- ClassFronter (16 institutions)
- LUVIT (5 institutions)
- Tutor2000 (5 institutions)

The strong position of the two North American systems BlackBoard and WebCT is not surprising, since they presently are the two dominant systems on the international market (*Observatory on Borderless Higher Education*, 2002):

> Some higher education institutions continue to develop in-house systems or buy into open source alternatives, but an ever-larger majority are purchasing licenses for proprietary platforms. Indeed, two vendors, Blackboard and WebCT currently dominate the market, not only in their native North America, but internationally. Yet both have been trading for little more than five years. Market consolidation is also underway.

FirstClass is a Canadian system that seems to have a strong position in Scandinavia, and Lotus Learning Space is an IBM product that is also much used in Europe.

The analyses found four European LMS systems seem to be significant competitors on the European market. TopClass may have a strong position in Europe since it originated in Ireland. ClassFronter is a Norwegian developed system that has a very dominant position in Norwegian universities and colleges. The system is available in a number of languages and sold to institutions in several countries. LUVIT originated at the University of Lund in Sweden, before it became a Swedish commercial company with reasonable success in Scandinavia and some other countries. Tutor2000 seems to be a successful LMS provider in the Czech Republic.

Table 6 lists the 52 commercial LMSs identified in the study with their provenance, URL and extent of usage:

Table 6. The Commercial LMS systems included in the analyses

Commercial LMS systems	Original Nationality	URL of LMS	# Inst. using it as LMS	# Inst. using it as other LMS	Sum of inst. using it
Ascot CourseMaster	Great British	www.ascot-systems.co.uk	1	0	1
Aspen	American	www.click2learn.com	1	1	2
Aulanet			0	1	1
BettyCOM	Swedish		0	1	2
BlackBoard	American	www.blackboard.com	9	5	14
Centra	American	www.centra.com	1	0	1
ClassFronter	Norwegian	www.fronter.com	16	0	16
Clix campus	German	http://campusonline.uni-freiburg.de:8181	1	0	1
COM-C	Danish	www.comc.dk	0	1	1
Corporate learning	German	www.global-learning.de	1	0	1
CourseKeeper	Norwegian	www.coursekeeper.com	2	0	2
Decus System			0	1	1
Destinations			0	1	1
DLS from ETS	German	www.click2q-online.com	1	0	1
Docent	American	www.docent.com	1	3	4
EDWIN	Danish		0	1	1
FDL Learning Environment	Great British	http://le.reading-college.ac.uk	1	0	1
FirstClass	Canadian	www.firstclass.com	3	4	7
Fle3	Finish	http://fle3.uiah.fi/	1	0	1
GLN – Global Learning Network	American	http://cisco.netacad.net	1	0	1
Granada Learnwise	Great British	www.oakwise.oakland.ac.uk	1	0	1
Imaker	Norwegian	www.imaker.no	0	1	1
Interwise-ecp	German	www.learnnetz-sh.de	1	0	1
Intralearn	American	www.intralearn.com	2	1	3
Intranets	American	www.intranets.com	1	1	2
IT Campus			1	0	1
It's Learning	Norwegian	www.itsolutions.no	1	0	1
Kark	Norwegian	http://kark.uib.no	1	0	1
LC Profiler	Finnish	www.lcprof.com	1	0	1
Learning solution	German		1	0	1
Learnlink evoeye	American	www.learnlink.com	1	0	1
LEKTOR	Swedish		0	1	1
Lotus Learning Space	American	www.lotus.com	3	3	6
LUVIT	Swedish	www.luvit.com	5	0	5
Nettutor			0	1	1
Ping Pong	Swedish	www.partitur.se	1	0	1
Plato			0	1	1
Proto			0	1	1
Response				1	1
Saba	American	www.saba.com	1	2	3
Simulnet			0	1	1
Skills Vantage			0	1	1
Solstra Hybrid			0	1	1
TeamWave				1	1
TopClass	Irish	www.wbtsystems.com	5	2	7
Tutor2000	Czech	www.kontis.cz	5	0	5
Verkkosalkku, Verkko-opisto	Finnish		0	1	1
Virtual-U	Canadian	www.vlei.com	0	1	1
Visit			1	0	1

Commercial LMS systems	Original Nationality	URL of LMS	# Inst using it as LMS	# Inst. using it as other LMS	Sum of inst using it
WebCT	Canadian	www.webct.com	16	4	20
Weblearn Plus			0	1	1
West			0	1	1

Regional Preferences and Market Leaders

In the countries that use English as their first language, the American LMSs seems to dominate:

> The overall impression is the domination of the scene by the major American-based LMSs, notably WebCT, Blackboard and TopClass. This is because of the use of English in the United Kingdom and Ireland. (Keegan 2002)

> WebCT has pushed hard to become the market leader with extensive promotion and presence at e-Learning conferences. (Keegan 2002)

> In Australia, WebCT seems to be the most widespread LMS system and Blackboard seems to be the first runner up. A NCODE-FLA (http://ncode.mq.edu.au) LMS survey (NCODE-FLA, 2002) of 34 Australian institutions conducted by Sue McKnight shows 25 instances of WebCT, 12 instances of BlackBoard, and 7 instances of in-house developed LMS systems. This is supported by a briefing on leading learning platforms (*The Observatory on Borderless Higher Education*, 2002) which claims that Australia is the country with the highest penetration of BlackBoard and WebCT licenses in the world since 76 percent of the country's 34 universities have such licenses. (Paulsen 2002 b)

In the countries that not use English as their first language, the American LMS have many user institutions:

> The research indicates that ClassFronter, WebCT, FirstClass, and BlackBoard seem to be the most used LMS systems in the Nordic countries. (Paulsen 2002)

> The most used system is the Czech TUTOR2000 (currently by 5 institutions). 3 interviewees have developed their own systems and the last 6 represent American commercially available LMSs (BlackBoard, Click2learn, GLN {Cisco}, Intralearn, Learning Space and WebCT). (Mičincová 2002)

But, the analyses show that the locally developed systems seem to have a strong position in the countries that not use English as their first language:

> ClassFronter is by far the market leader in Norwegian universities and colleges. Of those that offer online education, 65% used ClassFronter. (Runnestø and Ristesund 2002)

> Nordic institutions seem to prefer LMS-systems developed in the Nordic countries. Among the 25 different LMS systems that were identified in the analysis, 16 were of Nordic origin. All other systems were of American, Canadian, or Irish origin. (Paulsen 2002)

Institutions are slowly converting to the national LMS vendors, since the systems are in their mother tongue and want to be active in larger market and offer services to the general public. (Mičincová 2002)

Language is a main issue in Southern Europe and LMSs not translated to the countries' languages can be easily unsuccessful. (Dias, Dias, and Pimenta 2002)

Vendor Specific Issues

As the following statements show, the analyses indicate that there seems to be an overall satisfaction with the most used LMS systems:

There seems to be general satisfaction with WebCT as a user-friendly, competent product. (Keegan 2002)

Blackboard has given general satisfaction but is less widely marketed than WebCT. (Keegan 2002)

TopClass is praised for its student and records database. (Keegan 2002)

There is a large extent of confidence among the users of ClassFronter with regard to the service offered by the contractor and the fast developing speed the program has had. The program has been updated with four new versions yearly, and many user requirements have been accommodated. The user reference group for ClassFronter is unique in Norway. This group is a decisive reason for why many institutions have selected ClassFronter. (Runnestø and Ristesund 2002)

Competitive Issues

The findings that relate to the customers loyalty, user-friendliness, cost effectiveness, integration, and openness could be of special interest to providers of LMS systems who want to compete in the future market:

The institutions do not seem to be especially loyal to, or dependent on, one provider of LMS system. The majority of the institutions had changed system, planned to change system, or operated secondary systems. (Paulsen 2002)

LMS systems could have reached a point were user-friendliness, cost effectiveness, and integration with other systems is more important than new features. (Paulsen 2002)

The open source strategy may have an impact on the future LMS market. (Paulsen 2002)

It should also be noted that many systems could be improved with regard to linguistic issues, assessment tools, pricing, content creation and management:

An overall evaluation allow us to observe that the commercially available platforms can be very practical to start with but they have problems with linguistic issues, as well as with assessment tools adequacy to target groups and pricing. (Dias, Dias, and Pimenta 2002)

Most part of the systems researched seem to have problems with content creation and content management, students monitoring and assessment tools. Online administration and integration with other institution software and platforms were also a question. (Dias, Dias, and Pimenta 2002)

Finally, it should be noted that adaptability and management facilities on the level above individual courses are requested:

The unanimous data of LMS appearantly is "adaptability provided". (Fritsch and Föllmer 2002)

It is especially interesting to observe that several systems seem to lack facilities and services on the level above individual courses. (Paulsen 2002)

Self-developed Systems

Table 7 shows that the analyses revealed 35 different self-developed systems, and one may infer that there are remarkably many institutions that use self-developed LMS systems.

Table 7. Self-developed LMS systems included in the analyses

Self-developed LMS systems	Nationality	Url of LMS	Institution
	Czech		Czech-Swiss Institute
	Danish		Danmarks Netskole
	French		CNED
	German		Netzentwurf
	German		TU Chemnitz
	German		Akademie
ILIAS	German		Virtus
Lernen-im-netz	German		Akademie
Planetux	German		Virtuelle Universität
VC Prolog Tutor	German		Osnabrueck
VU	German		LVU
Wave learn	German		Darmstadt
	Greek		Aristoteles University of Thessaloniki
Aula virtual	Italian		Instituto Formazione Operatori Aziendali
Experienze	Italian	www.esperienze.net	Anonymous
Greenteam	Italian	www.greenteam.it/greenteam/education	Sinforml
Proprietary	Italian		University of Trento
	Norwegian		Høgskolen I Narvik
	Norwegian		Høgskolen I Oslo
	Norwegian		Høgskolen I Sør-Trøndelag
	Norwegian		Høgskolen I Stord/Haugesund
Apollon	Norwegian		Handelshøgskolen BI
Ed-On-Web	Norwegian		Høgskolen I Vestfold
Kurs.nlh.no	Norwegian		Norges Landbrukshøgskole
MvForum	Norwegian		Dronning Mauds Minne
PedIT	Norwegian		Globalskolen
SESAM	Norwegian		NKI Fjernundervisningen
e-cursos	Portuguese	www.e-cursos.com	Associação Empresarial de Portugal
Evolui	Portuguese		Prodigio
Formare	Portuguese	www.formare.pt	PT-Inovação
TWT Teaching Web Toolkit	Portuguese	www.mytwt.net	Universidade Católica Portuguesa
	Slovak		AINova
	Slovak		LCDE
ELIAS	Spanish	www.elearning.uvigo.es	University of Vigo
SSVN2000	Swedish		Statens skolor för vuxna

There may be many covert and vicarious reasons for choosing self-developed LMS-systems:

> There is a tradition that a bright computing center does not need to buy programs developed by others because the need to buy external programs would question the qualification of existing personel in such centers. (Fritsch and Föllmer 2002)

But the analyses indicate that institutions with self-developed LMS systems perceive the commercial systems as expensive and complex. The self-developed systems surpass linguistic problems and are regarded as supportive of special needs and target groups:

> Several institutions prefer self-developed systems. They perceive the commercial systems as expensive and complex and want to develop the systems to support their special needs.

They wanted cost effective systems with the ability to handle continuous enrolment and integration with student administrative systems and economy systems. (Paulsen 2002)

Own developed systems are simpler and directly related to the target groups; they surpass the linguistic problems of the commercially available platforms and are constantly updated, being able to improve their features according to trainers, trainees and administration evolution. Besides the linguistic advantage national marketing strategies together with competitive pricing contribute to the great use of those own developed LMSs. (Dias, Dias, and Pimenta 2002)

LMS functionality

Course Development Tools

The course content is usually developed with external tools before it is published in the LMS systems:

LMS systems are usually not used for development of course content. A broad range of external tools is used to develop the content before it is published in the LMS system. (Paulsen 2002)

To some interviewees LMS are mainly a form of support and sharing of information: Some institutions need to use external tools to the LMS and specialist support to course production, also suggesting that difficulties are based not in the platform but in the process of implementation. (Dias, Dias, and Pimenta 2002)

In the majority of cases there is no course creation with or inside the LMS in fact independent of the origin of the LMS - self-developed or purchased. (Fritsch and Föllmer 2002)

The analyses also indicate that there is a lack of available course content:

The lack of available content is deplored. (Fritsch and Föllmer 2002)

Student and Tutor Support Tools

There is a host of student and tutor support tools included in the LMS systems. However, the availability and quality of specific tools vary from tool to tool. Here are a few statements that elucidate this:

The student support tools available on the LMS are shown, generally, by the fora, chat mailing lists and email, having to bear in mind that not all the interviewed institutions use the so called services. Some have adopted a pedagogical model that discourages the use of the services of chat communication. Others include videoconference and collaborative technologies based on video streaming. (Dias, Dias, and Pimenta 2002)

There is evidence from the data collected that not all LMS have facilities to monitor student's performance, or when founded it is not enough for tutors' task. Also student

administrative and background data is not directly accessible to tutors who need to make specific queries to the system administrator in order to get it. Some interviewees identify facilities of student tracking with the support of the system administrator. These observations lead us to conclude that in most part of the cases, teachers are not the ones who monitor the students. (Dias, Dias, and Pimenta 2002, 9)

The concept of quizzes and multiple choice questioning, a feature of most American LMSs, is not considered adequate for European academic evaluation. (Keegan 2002)

There is not one LMS using an integrated examination procedure. (Fritsch and Föllmer 2002)

Administrative Systems

The need for sophisticated administrative systems increases with the administrative workload:

It seems a general trend that the administration facilities seem much more important for professional training institutions where (in general) courses are shorter, are "repeated", in several "editions", in short timelines, than in classical education institutions (universities), where the model adopted (longer, once a year) favours a more stable course / teacher / students association. (Dias, Dias, and Pimenta 2002)

With the introduction of large-scale online education, the need for integration between LMS systems and other online education systems increases. The analyses revealed a general lack of such integration. It is however interesting to see that the Nordic universities have standardized on a few national student management systems and that interesting integration efforts are in progress:

The Nordic universities have standardized on a few national student management systems. The systems are LADOK (Sweden), MSTAS (Norway), FS (Norway), STADS (Denmark), INNA (Iceland) and to some extent Oodi (Finland). (Paulsen 2002)

There is a general lack of integration between the LMS and the student management systems. The analysis showed that some LMS has no possibility for integration, other has the possibility to import data from the student management system, but only one system (SESAM, a self-developed system by NKI Distance Education) has full integration both ways. (Runnestø and Ristesund 2002)

Data produced by the LMS systems are not yet generally integrated into the institutions' administrative databases. (Keegan 2002)

LMS systems need to be integrated with a number of other systems in an organization that aims at providing efficient, large-scale, online education. (Paulsen 2002)

The integration between the LMS systems and the student administrative systems seems to be relatively poor. (Paulsen 2002)

The integration between the LMS-systems and the economy systems seems to be very poor. (Paulsen 2002)

Several of the interviewees are concerned about the opportunities and challenges regarding integration with the administrative system that records the student grades. (Paulsen 2002)

A records or test-database is kept - if at all centrally - at a different place of the administration than the enrolment database. Because of the privacy laws of data protection it is not so easy to change these procedures. (Fritsch and Föllmer 2002)

Unlike in other countries we do find many projects, where the enrolment as a university student is the only prerequisite for participating in the LMS. It explicitly does **not** mean that the LMS is integrated into the normal university enrolment procedures : on the contrary, in most cases this will be completely separated. (Fritsch and Föllmer 2002)

Technology

The analyses did not reveal important technical problems with the LMS systems. There were however many interviewees who expressed a wish for higher bandwidth to be able to provide more multimedia content and services:

Concerning the technological aspects, in general, the access to the LMS is through Internet, and the speed of the system depends on the limits of bandwidth available for each user. Users are accepting this situation as satisfactory, except two interviewees; one uses video contents on their courses, and the other has a large experience in corporations with their own network. (Dias, Dias, and Pimenta 2002)

Neither the limitation of student numbers nor the limits of number of courses provided are real problems for the systems interviewed. (Fritsch and Föllmer 2002)

As expected the speed provided by the systems is much higher than the velocity of learners systems at large. (Fritsch and Föllmer 2002)

Economic Issues

Cost effectiveness becomes more important as the institutions become large-scale providers of online education. The interviewees have, however, vague knowledge about the system's maintenance and operation costs. The cost and pricing structure for the commercial systems vary from system to system. This could make it difficult to compare real costs. Some interviewees were considered about high and increasing prices for the commercial LMS systems. The following findings relate to these economic issues:

Recent price increases, often quite considerable, are a feature of the market with prices in the range € 20.000 to € 50.000 being quoted. (Keegan 2002)

The costs and pricing structure for the commercial systems vary from system to system. This could make it difficult to compare the real costs. (Paulsen 2002)

Many interviewees mentioned that economic aspects are hard to identify. However, those who gave objective values, converged for a staff team of around 2~3 people full-time (technicians plus help desk), plus a variable size support team depending on the number of users who need help. Teachers / tutors are also an additional cost, they usually require some initial training in using the LMS. (Dias, Dias, and Pimenta 2002)

The institutions are facing significant financial problems, are afraid of announced charge increases of the LMS. The system development stagnates because of this lack. Faster implementation of the *e*Europe+ targets might have been reached if this implementation would not be largely coming from national budgets in the candidate countries. (Mičincová 2002)

Installing a complete system mostly meant to buy a new machine and database software, which easily sums up to some €100.000 Euro. But the answers of the majority of projects will hide these cost behind the statement that it is self-developped, open source, or not available (n.a.). (Fritsch and Föllmer 2002)

Overall Evaluation

LMS systems are not able to handle all the functions the institutions want, and they could be improved in many ways. But most systems encountered in the analyses seem to be good enough for handling online education successfully:

At present there is a tendency to organize and structure the e-Learning offer using a type of software somewhere classified as Learning Management System. Those systems are dedicated to some issues of the learning process, but in almost all the cases (commercially available systems or self developed) the systems are not able to perform all the activities the institutions need. Administration aspects, integration with existing software and content management are some of the issues not well treated by most part of the LMS studied. (Dias, Dias, and Pimenta 2002)

There were cases in the study, where a kind of facility of a system was not available (e.g. synchronous communication). It must be considered that the institutions are choosing their system and its functionalities according to their future planned activities and requirements. That means that in spite of the fact that the system seems to have a shortage it is actually not the case, because the system in that specific form is the most suitable and fully satisfactory for the institution. (Mičincová 2002)

Knowledge, Policy, and Strategy

The analyses indicates that there is a need for enhanced focus on LMS knowledge, policy, and strategy in Southern Europe:

Another interesting observation is the lack of a common understanding concerning terms and functionalities of the LMS systems. (Dias, Dias, and Pimenta 2002)

Another important issue is the universities e-Learning managers concern with the university policy and strategies for this field. Apparently Southern European universities are not dedicating enough importance and attention to this subject. (Dias, Dias, and Pimenta, 2002)

Another important issue is the universities e-Learning managers concern with the university policy and strategies for this field. Apparently Southern European universities are not dedicating enough importance and attention to this subject. (Dias, Dias, and Pimenta, 2002)

The analyses further indicate that the introduction of LMS systems could be a source for conflict between administration and academia.

There seems to have emerged a new dichotomy that plays a major role in the development of web education systems. The dichotomy between academia and administration. (Fritsch and Föllmer 2002)

The task of such a computing center indeed will necessarily produce a conflict between the university's administration which hoped for increase of effciciency and decrease of performance cost and the department which always has to look for proofs of their respectability tested in - at least- the "own" market. (Fritsch and Föllmer 2002)

E-learning Standards

The institutions in North Western Europe are sensitive to the e-learning standards and they are considered almost as a norm. The Nordic interviewees are aware of the standards, and several claim to follow them. But few state that the standards are important to their institution, and e-learning standards do not seem to have had much impact on online education in the Nordic countries. The German analysis states that standardization will play an important role in the future. In Southern Europe it also seems to be a considerable ambivalence with regard to e-learning standards.

The interviewees are aware of the e-learning standards, and several claim that their systems follow the standards. But few state that the standards are important to their institution, and e-learning standards do not seem to have had much impact on online education in the Nordic countries. (Paulsen 2002)

All institutions are sensitive to SCORM and IMS standards and dissemination of these standards has led to them being considered almost as a norm. (Keegan 2002)

Summarized one can say that questions of standardization and optimized possibilities of synchronous communication with different tools will play an important role in the future. (Fritsch and Föllmer 2002)

In relation to Standards, interviewees stressed the absence of both 'de facto' and 'proposed', technical standards. Curiously, (only) one interviewee mentioned his/her belief that standardization will have a positive impact in internationalization of eLearning businesses; and, on the other hand, one other person stated the complementary idea "Since our courses are country specific, standards are not yet relevant". The existence of standards is welcome, both for marketing reasons (as indicated before), but also for cost reduction ('rationalization of resources') or LMS migration. (Dias, Dias, and Pimenta, 2002)

Ten Important Findings from a European Perspective

Ten important findings result from the research reported here. These findings will be of value to:

- Representatives of the European Commission and international planning agencies
- National government agencies planning for e-Learning provision in their systems
- Developers and vendors of Learning Management Systems
- Universities and training institutions considering entering the e-Learning market or considering upgrading their existing systems.

1. There are significant regional differences within Europe with regard to how far the institutions have come in their use of LMS systems. The differences seem to follow the regional statistics for Internet users, which means that the Southern Europe, the Czech Republic and Slovakia seems to be less mature with regard to use of LMS systems than the other regions.

2. The analyses indicate that there is a clear trend that institutions offer more online courses today than they did three years ago. One may say that the trend is to go from small-scale to large-scale online education. If one characterizes institutions that offer at least 50 online courses as large-scale providers of online education, 30 of the 89 institutions (34%) we have data from could be characterized as large-scale providers. The analyses indicate that the trend towards large-scale online education has come further in the Nordic countries (60%) than in the other regions.

3. The analyses indicates that the BlackBoard, ClassFronter, FirstClass, Lotus Learning Space, LUVIT, TopClass, Tutor2000, and WebCT are among the most used commercial LMS systems in Europe.

4. The analyses found four European LMS systems that seem to be significant competitors on the European market. TopClass originated as a European Commission project at the University College Dublin, in Ireland, before becoming an Irish campus company and then migrating to the United States. ClassFronter is a Norwegian developed system that has a very dominant position in Norwegian universities and colleges. The system is available in a number of languages and sold to institutions in several countries. LUVIT originated at the University of Lund in Sweden, before it became a Swedish commercial company with reasonable success in Scandinavia and some other countries. Tutor2000 seems to be a successful LMS provider in the Czech Republic.

5. A striking conclusion of this study is that the generally accepted position that the market is dominated by the American LMSs, is not the norm throughout Europe. In the countries that not use English as their first language, locally developed LMS systems have successfully repelled the American products. A remarkable large number of the LMS systems used in Europe are commercial systems developed locally or self-developed systems at the institutions. However, very few of these systems seem to have more than a few user institutions.

6. There are remarkably many institutions that use self-developed LMS systems, and there may be many covert and vicarious reasons for choosing self-developed LMS-systems. But the analyses indicate that these institutions perceive the commercial systems as expensive and

complex. The self-developed systems surpass linguistic problems and are regarded as supportive of special needs and target groups.

7. With the introduction of large-scale online education, the need for integration between LMS systems and student management systems increases. The analyses revealed a general lack of such integration. It is however interesting to see that the Nordic universities have standardized on a few national student management systems and that interesting integration efforts are in progress.

8. Cost effectiveness becomes more important as the institutions become large-scale providers of online education. The interviewees have, however, vague knowledge about the system's maintenance and operation costs. The cost and pricing structure for the commercial systems vary from system to system. This could make it difficult to compare real costs. Some interviewees were considered about high and increasing prices for the commercial LMS systems.

9. The analyses indicate that there is a need for enhanced focus on LMS knowledge, policy, and strategy in Southern Europe. In particular universities e-learning managers are concerned with the university policy in this field. Apparently they mean that Southern European universities are not dedicating enough importance and attention to this subject. The analyses further indicate that the introduction of LMS systems could be a source for conflict between administration and academia.

10. The institutions in North Western Europe are sensitive to the e-learning standards and they are considered almost as a norm. The Nordic interviewees are aware of the standards, and several claim to follow them. But few state that the standards are important to their institution, and e-learning standards do not seem to have had much impact on online education in the Nordic countries. The German analysis states that standardization will play an important role in the future. In Southern Europe it seems to be a considerable ambivalence with regard to e-learning standards.

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Online Education Systems: Definition of Terms

By Morten Flate Paulsen
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NKI Distance Education
April 2002

This paper is written in order to establish a common framework of terms for the *Web Education Systems Project* (Web-edu) which is supported by the European Leonardo da Vinci program. The project's web-pages are available at
www.nettskolen.com/in_english/web_edu.html.

The following main terms are presented and explained in a logical sequence:

- Online education
- Online education systems
- Content Creation Tools (CCT)
- Learning Management System (LMS)
- Student Management System (SMS)
- Accounting System (AS)

Online Education

There are many terms for online education. Some of them are: virtual education, Internet-based education, web-based education, and education via computer-mediated communication. The project uses a definition of online education that is based on Desmond Keegan's definition of distance education. Hence, online education is characterized by:

- the separation of teachers and learners which distinguishes it from face-to-face education
- the influence of an educational organization which distinguishes it from self-study and private tutoring
- the use of a computer network to present or distribute some educational content
- the provision of two-way communication via a computer network so that students may benefit from communication with each other, teachers, and staff

Online Education Systems

Online education systems are defined as all systems that support online education. In the following, this paper discusses two different models for online education systems developed by the web-edu project. The models are:

- The Jigsaw model for online education systems
- The Hub model for online education systems

The Jigsaw Model for Online Education Systems

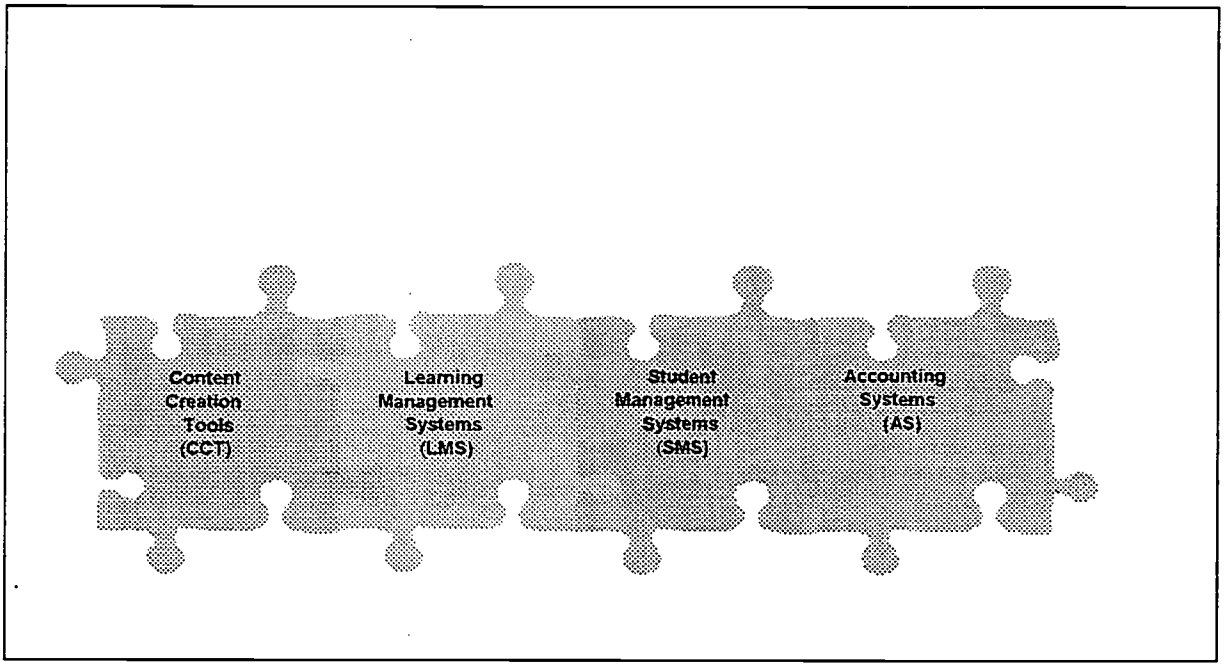
The jigsaw model is a simplistic model used in the web-edu project. It t includes the four main categories of online education systems that are listed below and presented in Figure 1.

- Content Creation Tools (CCT)

- Learning Management System (LMS)
- Student Management System (SMS)
- Accounting System (AS)

It is called the jigsaw model to indicate that these systems should fit together to exchange data more or less seamlessly.

Figure 1. The jigsaw model for online education systems



Content Creation Tools (CCT)

Content creation tools are the tools that course designers and teachers use to create the content in online education courses. The content creation tools are used to develop learning material. There are many types of content such as for example plain text, slides, graphics, pictures, animations, audio, video etc. Typical examples of theses systems are DreamWeaver, Frontpage, Word, PowerPoint, and Director. These are generic tools with few features developed specially for online education.

In addition to the much-used generic CCT tools, there are a number of CCT tools that are specially made for development of educational content. These CCT tools are termed authoring tools.

Authoring Tools

Authoring tools could be regarded as a subset of content creation tools. Brandon Hall (2001) defines an authoring tool as "a software application, used by non-programmers, that utilizes a metaphor (book, or flow chart) to create on-line courses". One may say that authoring tools are content creation tools that are especially developed for creation of educational content.

Learning Management System (LMS)

Learning Management System is a broad term that is used for a wide range of systems that organize and provide access to online learning services for students, teachers, and administrators. These services usually include access control, provision of learning content, communication tools, and organizations of user groups.

Some examples of LMS systems are WebCT, Blackboard,...

Brandon Hall (2001) presents the following definition:

> A *Learning Management System (LMS)* is software that automates the administration of training events. All Learning Management Systems manage the log-in of registered users, manage course catalogs, record data from learners, and provide reports to management.
>
> There used to be a distinction between Learning Management Systems and more powerful Integrated Learning Management Systems. That distinction has now disappeared. The term Learning Management System is now used to describe a wide range of applications that track student training and may or may not include functions such as:

Authoring

Classroom management

Competency management

Knowledge management

Certification or compliance training

Personalization

Mentoring

Chat

Discussion boards

Virtual Learning Environment (VLE)

Virtual learning environment is a term that to some extent is used instead of LMS. The two terms have more or less the same meaning, but one may argue that VLE focus less on the features related to the management of learning. Bandon Hall (2001) defines learning environment this way:

> A *Learning Environment* is software designed as an all-in-one solution that can facilitate online learning for an organization. It includes the functions of a learning management system for those courses within the learning environment, but it may not be able to track online courses that were not created within this particular learning environment.
> A learning environment is characterized by an interface that allows students to register and take courses, staying within that environment for the duration of the course. The program will usually include some self-instructional portions, along with an academic model of a multi-week course. This model is often facilitated by an instructor, where a group can proceed on a week-to-week basis with seminar assignments. Most learning environments also include an authoring capability for creation of additional courses for the instructor.

Student Management System (SMS)

The student administration system is the core system in an educational institution. It is used for management of the most pivotal information about entities such as students, faculty, courses, applications, admissions, payment, exams, and grades. An effective SMS system is crucial for all educational institutions.

Enterprise Resource Planning (ERP) systems or Human Resource Information Systems (HRIS)

Companies and corporations have comparable systems that hold important information about their employees. These could be termed Enterprise Resource Planning (ERP) systems or Human Resource Information Systems (HRIS). These systems will provide some of the same functionalities as the student management systems.

Some examples of SMS systems are PeopleSoft, Banner, MSTAS, FS, and Ladoc.

Brandon Hall (2001) provides the following descriptions of ERP and HRIS systems:

> *Enterprise Resource Planning (ERP)* is an industry term for large, often multi-module software applications that manage many facets of a company's operations including product planning, parts purchasing, maintaining inventories, interacting with suppliers, providing customer service, tracking orders, and managing resources and financials. SAP, PeopleSoft, and J.D. Edwards are some well-known ERP providers.
>
> *Human Resource Information Systems* (HRIS) are similar to ERP applications but are aimed specifically at the management of a company's human resources.

Accounting System (AS)

The accounting system is used for recording the economic transactions between the institution and its customers and suppliers. In an online education setting, the most important customers and suppliers are the students and the teachers.

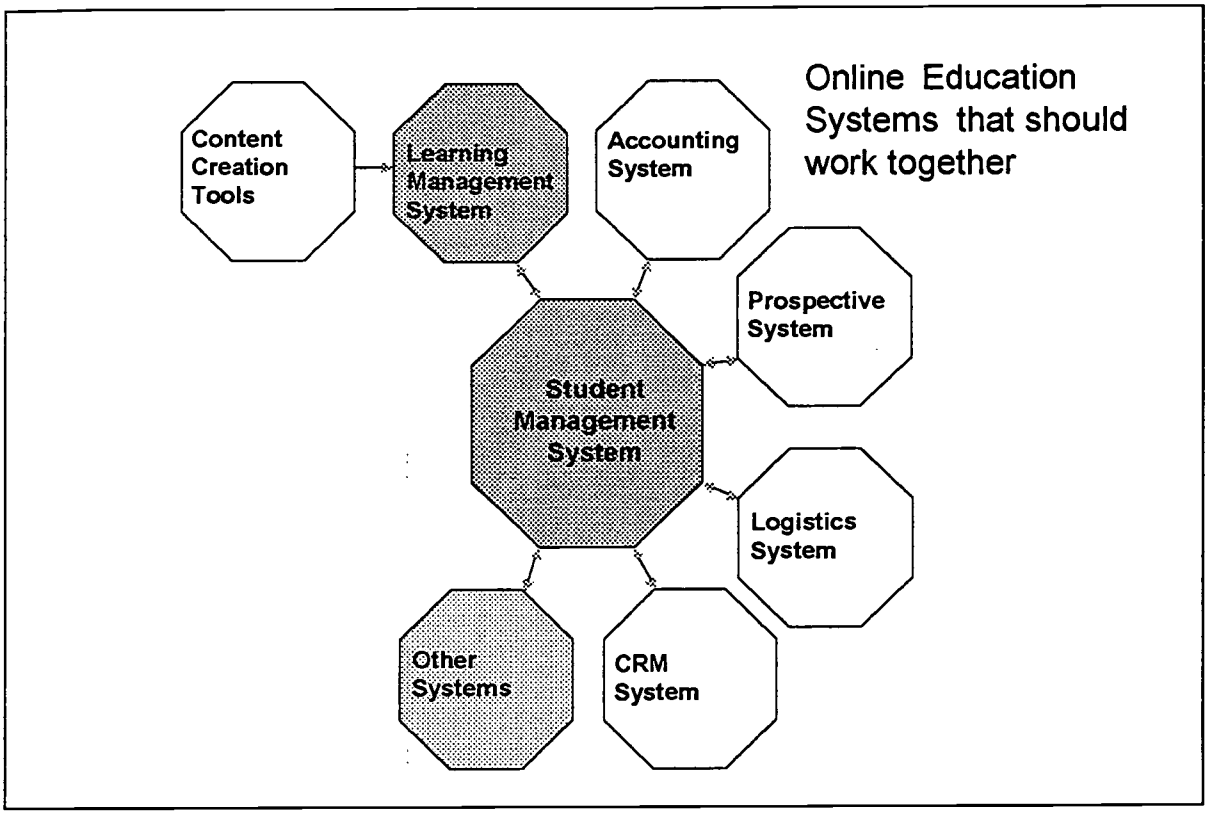
The data from the accounting systems should be used to deny system access to students who do not pay their tuition fees. Some institutions already accept online enrollment, online payment, and online student credit account information. Other institutions provide online tutors with their updated salary account information. This functionality requires some integration between the systems.

The Hub Model for Online Education Systems

The hub model is more complex than the jigsaw mode. It is included to show that online education systems are becoming more and more complex. This is partly due to the institutions' need to rationalize the operation to handle the growing number of online students and courses, and partly due to the fact that the users are increasingly expecting more sophisticated services.

The model is termed the Hub Model to indicate that the Student Management System is the central, most important system for large-scale online education. For historical, legal, and financial reasons, the SMS system is the most important system for an educational institution. Hence, all other systems that could offer online education services should rely on the SMS system as the master system with which they exchange data.

Figure 2. The Hub model for online education systems



Related Terms

Brandon Hall (2001) explains a number of related terms:

Content Management Systems (CMS) are used to store and subsequently find and retrieve large amounts of data. Content Management Systems work by indexing text, audio clips, images, etc., within a database. In addition, CMS often provide version control and check in/check out capabilities. Using robust built-in search capabilities, users can quickly find a piece of content from within a database by typing in keywords, the date the element was created, the name of the author, or other search criteria.

Content Management Systems are often used to create information portals for organizations and can serve as the foundation for the practice of knowledge management. They can also be used to organize documents and media assets. For example, a newspaper agency may use a content management system to provide an archive of every story ever written for the paper. Likewise, they might use the CMS to provide an extensive library of photographs that are reusable for future stories.

A *learning content management system* is an environment where developers can create, store, reuse, manage and deliver learning content from a central object repository, usually a database. LCMS generally work with content that is based on a learning object model. These systems usually have good search capabilities, allowing developers to find quickly the text or media needed to build training content.

Learning Content Management Systems often strive to achieve a separation of content, which is often tagged in XML, from presentation. This allows many LCMS to publish to a wide range of formats, platforms, or devices such as print, Web, and even Wireless Information Devices (WID) such as Palm and windows CE handhelds, all from the same source material.

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Learning Management Systems (LMS) used in Southern Europe

By Ana Dias, Paulo Dias and Pedro Pimenta

Abstract

This part of the study refers to Southern Europe. Research and interviews were applied to a number of institutions, experienced in e-Learning and using Learning Management Systems (LMS) to support their e-courses provisions and e-Learning structures.
A total of 21 interviews were carried out all over the concerned countries – Portugal, Spain, Italy, France and Greece.

A Southern Europe overview puts in evidence the regions figures in terms of Internet users. In fact 17,5% of Southern European population uses Internet, much less then the 50% of Internet users in the Nordic Countries, the 33% in North-western Europe, the 30% in Germany, 10% in Czech Republic (similar to Portugal and Greece).

Interviews include 11 self developed LMSs and 5 commercially available LMSs. From the commercially available LMSs in use, 4 Institutions use Web – CT (3 are Universities), 2 other Institutions use Blackboard, 2 other use Learning Space and one institution uses Docent and another institution uses Intralearn.
There are a total of 561 online courses that are using the 16 LMS systems. Important is to note that 4 institutions have from 1 to 3 courses, 7 institutions have from 4 to 15 courses and only 10 have from 16 to 85 courses. These mean that 50% of the researched institutions have less then 15 courses online.
There are a total of 470 online tutors and a total of 41296 only students.

At present there is a tendency to organise and structure the e-Learning offer using a type of software somewhere classified has Learning Management System. Those systems are dedicated to some issues of the learning process, but in almost all the cases (commercially available systems or self developed) the systems are not able to perform all the activities the institutions need. Administration aspects, integration with existing software and content management are some of the issues not well treated by most part of the LMS studied.
Language is a main issue in Southern Europe and LMSs not translated to Countries languages can be easily unsuccessful.
The research also led us to observe that most part of the e-Learning managers assume a position of experimentation and initiation on the e-Learning process (50% of the researched institutions have less then 15 courses online).

An overall evaluation allows us to observe that the commercially available platforms can be very practical to start with but they have problems with linguistic issues, as well as with assessment tools adequacy to target groups and pricing.
Own developed systems are simpler and directly related to the target groups; they surpass the linguistic problems of the commercially available platforms and are constantly updated, being able to improve their features according to trainers, trainees and administration evolution. Besides the linguistic advantage national

marketing strategies together with competitive pricing contribute to the great use of those own developed LMSs.
Another important issue is the Universities e-Learning managers concern with the University policy and strategies for this field. Apparently Southern European Universities are note dedicating enough importance and attention to this subject.

1. Methodology

This part of the study refers to Southern Europe. Research and interviews were applied to a number of institutions, experienced in e-Learning and using Learning Management Systems (LMS) to support their e-courses provisions and e-Learning structures.
This analysis is based on in-depth, qualitative interviews applied to leading e-Learning Managers from institutions located in Southern Europe. A total of 21 interviews were carried out all over the concerned countries – Portugal, Spain, Italy, France and Greece. The interviewees were selected first by the demonstrated experience in the e-learning field and then according to their availability to answer to the interviews. The interviews were carried out via e-mail, phone or face-to-face. The researchers involved in the interviews used also the institutions web pages and included information collected from there. Some of the interviews were made in Portuguese, Spanish and Italian and then translated into English. Other interviews were done directly in English (France and Greece).
The interview guide was developed by the international research team according to criteria of functionality and utility of the research.
The interview guide was focusing is attention on the following topics:

- Institutions and LMSs;
- Course Development Tools;
- Tutors support tools;
- Administrative systems;
- Technology;
- Price;
- Overall evaluation;
- Future features to include in existing LMS systems

2. Southern Europe Overview

Southern Europe can be characterised as a region with different countries, communicating in different languages in a relatively small geographical area.
Portugal, Spain, France, Italy and Greece occupy an area of 1,577,373 Square Kilometres, with a population of 177,6 Million People, speaking 5 completely different official Languages, independently of other less spoken languages in those countries.
According to data available from Eurostat and presented in table 1, there are 31 Million of Internet users in Southern Europe, representing 17,5% of the population.

Table 1. Country, Official Language, Inhabitants and Internet penetration

Country	Language	Area (sq km) [1]	Inhabitants (millions)[2]	Internet hosts (per 100 inhabitant)[3]	Internet users (per 100 inhabitant)
Portugal	Portuguese	92 391	10.2	1.2	10.0
Spain	Castilian	504 782	39.5	1.4	13.9
France	French	547 030	59.5	1.7	16.9
Italy	Italian	301 230	57.8	2.7	23.3
Greece	Greek	131 940	10.6	1.0	9.5
Total		1,577,373	177,6		

The number of Internet users, compared with other European Regions and with USA is very low in Southern Europe. Nordic Countries have 50% of the population using the Internet and the USA 56,5%.

Table 2 shows data referring to some European Regions and USA.

Germany with has nearly 30% of the population using Internet, Czech Republic can be compared to Portugal or Greece, having a population of around 10 Million People and having around 10% of the population using Internet.

North Western Europe occupy an area of 315 100 Square Kilometres, with a population of 63,6 Million People, all are speaking English as main language for communication, independently of other less spoken languages in those countries. There are 21 Million Internet users in North Western Europe, representing 33% of the population.

Nordic Europe occupy an area of 1 154 308 Square Kilometres, with a population of 23,9 Million people, speaking 4 different languages (Nordic Languages are all different but very similar in their route. In average people from different Nordic countries are able to understand each other). According to data available and presented in table 2, there are 12 Million Internet users in Nordic Europe, representing 50% of the population.

Table 2 Country, Official Language, Inhabitants and Internet penetration

Country	Language	Area (sq km) [4]	Inhabitants (millions)[5]	Internet hosts (per 100 inh)[6]	Internet users (per 100 inh)
Portugal	Portuguese	92 391	10.2	1.2	10.0
Spain	Castillian	504 782	39.5	1.4	13.9
France	French	547 030	59.5	1.7	16.9
Italy	Italian	301 230	57.8	2.7	23.3
Greece	Greek	131 940	10.6	1.0	9.5
Germany	Deutsch	357 021	82.2	2.3	29.6
Czech Republic[7]	Czech	78 866	10.3	1.6	9.7
Ireland	Irish	70 280	3.8	2.3	27.5
United Kingdom	English	244 820	59.8	3.5	33.5
Norway	Norwegian	324 220	4.5	11.2	52.7

[1] Data from CIA World Factbook (http://www.odci.gov/cia/publications/factbook/, 6 of July 2002)
[2] Data from "People in Europe", Eurostat, 2002, referring to January 1st, 2001.
[3] Data from "Enterprises and their activities", Eurostat, 2002, referring to 2000.
[4] Data from CIA World Factbook (http://www.odci.gov/cia/publications/factbook/, 6 de Julho de 2002)
[5] Data from "People in Europe", Eurostat, 2002, referring to January 1st, 2001.
[6] Data from "Enterprises and their activities", Eurostat, 2002, referring to 2000.
[7] Data from "The candidate countries", Eurostat, 2002, referring to 2000.

Sweden	Swedish	449 964	8.9	7.0	56.4
Finland	Finish	337 030	5.2	13.6	44.5
Denmark	Danish	43 094	5.3	13	43
USA	English	9 629 091	278.1	29.3	55.8

From this analysis we would like to emphasise the differences between the Northern Europe Internet uses and the Southern Europe ones. In fact we range from a 50% of Internet users in the Nordic Countries to 33% in North-western Europe, 30% in Germany, 10% in Czech Republic and 17,5% in Southern European countries. These figures will reflect on the Countries and Regions level of development in the e-Learning field.

Table 3 represents a summary of the important relations between area, population and Internet users in different European Regions.

Table 3 European Region, Area, Inhabitants and Internet users

Region	Area (sq km)	Inhabitants (millions)	Internet users (% Inhabitants)
Southern Europe	1 577 373	177,6	17,5%
Germany	357 021	82,2	29,6%
Czech Republic	78 866	10,3	9,7%
North Western Europe	315 100	63,6	33%
Nordic Europe	1 154 308	23,9	50%

This evidence about North – South disparities is recognise by the European Commission in the article "The digital divide: disparities between member states", downloaded from the europa web site[8]:

" The eEurope benchmarking report put in evidence the high disparities between Member States in IT progress. The Report shows considerable differences between countries in almost every item analysed. Not amazingly, there is a group of e-advanced countries ranking high in almost all indicators, while the less IT advanced States rank poorly in many aspects. A conclusion of the Report is that "many Member States are too far behind leading EU Member States in Internet penetration and use. More efforts are needed to close the gap."

Differences in Internet and broadband take-up reflect an EU North-South digital divide.....

Other indicators show a similar geographic pattern. There are more than 20 PCs connected to the Internet per 100 pupils in the schools of Denmark and Luxemburg, and more than 10 in Finland and Sweden, while 8 countries rank below 5 PCs per 100 pupils, with Spain, Germany, Italy, Greece and Portugal in the last positions. The more advanced countries show their pre-eminence in several indicators, so not surprisingly Denmark, Sweden and Finland, for instance are the 3 leading countries in the highest percentage of workers having computer training.

Several reasons could be advanced to explain this gap, including cultural aspects. The document "Benchmarking National and Regional E-Business Policies", from the Enterprise Directorate finds that in countries like Spain, Italy and Greece "a

[8] http://europa.eu.int/comm/education/elearning/wn2002_03/dossier.html, visited on 22/7/02

lack of e-business awareness is still a major hurdle to its widespread adoption". So probably attitude has a role to play in order to explain such EU disparities....
Probably the European North-South North-South digital gap should be regarded as a temporary effect due to different growth rates and unequal starting points, so it is expected to be reduced in the near future. At least the general trend shows strong progress in economic and social cohesion in the EU. The First Progress Report on economic and social cohesion, presented on 30 January 2002 by the European Regional Policy Commissioner Michel Barnier, confirms that "the least prosperous countries (Spain, Greece and Portugal) are indeed catching up: the extent to which they originally lagged behind has shrunk by nearly one third in the last 10 years, with per capita GDP rising from 68% to 79% of the Community average". But lastly, although the progress done, the Report shows that "the gaps between countries and regions in Europe in terms of population density, levels of education and access to new technologies are still too wide."
Bellow we describe some Southern European characteristics and cultural factors which can began to give us a picture of the context:

- Southern Europe is an area highly populated with 5 countries and speaking 5 different languages (Portuguese, Spanish, French, Italian and Greek);
- In all Southern European Countries the urban areas are much more populated then rural areas;
- 5 different languages are spoken, besides less spoken languages in those countries
- Due to historical reasons, some of the Southern European Countries, have developed particular and privileged relations with a set of other countries, which share the same language (Portuguese speaking Countries, Spanish speaking Countries, Francophone Countries);
- In Southern Europe Countries, Distance Education in the classical sense (correspondence courses and TV based teaching) was not very much developed mainly due to peoples physical closeness;
- Professionals are used to get training from their local training centres, or travel and get training in other training centres outside their hometown;
- In general training is provided in their own country and using their own country language;
- We can say that it is rare to find a professional applying for training in other countries, not only because of the language difference, but also due to the distance and to the costs involved.
- In the case of large companies or multinational companies, professional are induced to learn other languages, and it is common for them to learn or apply for learning in other countries;

For the propose of providing a better understanding of Southern European specificities we provide a short overview of the e-learning field in the countries involved is this study.

2.1 Portugal

Portuguese Distance Education is a very recent phenomenon. The Portuguese Universidade Aberta[9] was created in 1988 and is the Portuguese Public University devoted to Distance Education.

[9] Open University of Portugal

More recently, with the emergence of new information and communication technologies, other universities, oriented towards face-to-face studies, have developed a set of activities in the online education field, especially using Internet tools.

Three years ago Ana Dias (Cisaer, 2000) described the Portuguese scene in this field: "Online education in Portugal is a very unstructured domain, at both public and private level.

There are no national bodies directly concerned with this issue and the universities that should be responsible for that development are starting their work in the field.

This means that the offer of distance learning courses using the web is not structured neither in the public institutions, universities or training centres. In fact, the Cisaer (1999) Survey shows that in Portugal there is no institution, which offer courses online in a systematic way. In almost all analysed cases, the web courses provided are developed in the context of pilot projects, financed by the European Union and with a limited life span.

INOFOR – the Institute for Innovation in Training is the single national body that expresses its concern with the emerging issues related to distance learning provision via the web. In the last year there was a growing number of institutions involved in e-learning activities. In particular Training Institutions and Universities, which are migrating to e-Learning provisions in a large speed and are organising their Education and Training offer also in an online basis."

Today it is not yet clear how will the training and education markets evolve in this field but institutions are purchasing commercially available systems or develop their own systems and are experiencing their use with different target groups. We can refer to an impressive evolution of the e-Learning market into an organised and structured direction in the last two years.

The most part of the Universities are using Web Ct as platform for distributing their learning, either internally to their face-to-face students either to the Continuous Training market. The penetration of Web CT in the Universities is impressive.

The private companies are selling either Portuguese solutions or solutions adapted to Portuguese language and market. This aggressive policy is leading some bigger companies, to leading positions in terms of penetration of their LMSs in the training market.

2.2 Spain

Three years ago, the Cisaer study reported background information about Distance Learning and the online education field in Spain. In this worldwide study Ana Dias (2000) wrote:

"Distance Education in Spain, was initiated in the seventies. UNED[10], the Spanish Open University, was created in 1972 aiming to improve the cultural progress and to socially develop the country in a perspective of equal opportunities.

Besides UNED, another institution was traditionally responsible for the large development of distance education in Spain: CEPADE (the Post-graduate Centre in enterprise management studies, directly dependent on the Madrid Polytechnic

[10] Universidad National de Education a Distancia

University General Foundation). CEPADE was one of the first e-learning structures in Spain, which was using First Class in a large scale.
In the nineties, a new and very innovative university was born and revolutionised the distance education scene: the Universitat Oberta de Catalonya (UOC). Created by the Regional Government of Catalonya, this university had a new vision, to put information and communication technologies at the service of students and teachers. Having more then 10 000 students all over the world, UOC developed its own LMS system called "Virtual Campus". The participants are able to communicate amongst themselves, with the tutor and with the electronic environment, having access to forums and chats. The students also have access to a Virtual Library and to the bibliographical UOC database.
Online education evolved rapidly in Spain and there are a large amount of face-to-face universities, training centres and private companies adopting this type of learning."

Today Spain has a wide and spread e-learning market. A simple search using a search engine like Google or Yahoo, searching for "e-learning in Spain" can provide us with a wide range of entrances with web sites selling e-learning solutions and institutions using e-learning as a mean for distributing e-courses.

2.3 France

Only two years ago, anyone asking about e-learning in France would have gotten a very confused stare as an answer. Ana Dias (2000) wrote about the French online education field:
"In France there are different structures organising and promoting online education, on the basis of pilot projects, either European or national. The Ministry of Education, Research and Technology[11] has set up a National Educational Network that allows individual users to access pedagogical multimedia material available on the web.
At the *educasource* web site (www.educasource.education.fr) and at the *didasource* web site (www.cnpd.fr/didasource/), it is possible to find an information system with pedagogical material and online documents.
The French "country regions"[12] have also developed different strategies to promote online education, and there are other representative boards with web presence. Among others we can refer:

- GEMME (Higher Education Group for Mediated Teaching[13]), which groups higher education institutions and puts documents dedicated to open and distance learning available online;
- the Paris Chamber of Commerce PREAU - a lab dedicated to the new educational technologies;
- THOT the Internet service-news, distance learning to French speaking countries.

In the regional contexts we can also highlight the open and distance learning network created in the Rhône-Alpes area. This regional network regroups AFPA[14] (3 sites), CNAM[15] (4 sites), CNED (2sites), GRETA[16] (9 sites). It is a

[11] Ministère de L'Éducation Nationale de La Recherche e de la Technology
[12] Départments
[13] Groupement pour L'Enseigment Supérieur sur Mesure Mediatisé
[14] Association de Formation Profissionel pour les Adultes

network based on the voluntarism of its members, where the service is driven from the local community needs.
CNED, the National Distance Education Centre[17] has recently created its electronic campus[18], offering communication tools to students as well as the possibility to work on exercises and to be in permanent contact with the tutor.
In France, like in the rest of Europe, European pilot projects are responsible for a large part of the market movements.
The online education field is evolving rapidly in France and there is a large amount of face-to-face universities, training centres and private companies adopting this type of learning."

Today French Universities and Training Organisations are using e-learning strategies. French Companies and corporations are offering online training to employees.
Some Universities are gather in the Interuniversity Federation for Distance Learning (FIED), other Universities have signed an agreement with CNED, and others have signed an agreement with the CNAM. Furthermore there are Universities' Continuing Education Departments or other Higher Education Institutions, which have formed alliances either amongst themselves or with private-sector partners to create digital campuses.
French Ministries of Education and Research promoted two key initiatives in the ODL field, the Form@sup (http://www.formasup.education.fr/index.php), an information server for Higher Education ODL programmes and the call for projects to create French Digital Campus (http://www.educnet.education.fr/superieur/campus.htm).
It also has numerous teaching resources, which can be accessed directly online, as well as links to other resource sites such as ÉducaSup (http://www.educasup.education.fr/) and Éducasource (http://www.educasource.education.fr/).
A call for projects to create Digital Campuses was launched in 2000. These projects are intended to provide a selection of post-secondary ODL courses, which use new information technologies for clearly identified fields and target groups. This call for projects led to the selection of 49 projects in 2000. Another 66 were chosen in 2001 (http://www.educnet.education.fr/superieur/campus2001.htm). There was a call also already in 2002 (http://www.educnet.education.fr/superieur/campus2002.htm). We tried to open the Web sites of the Digital Campuses financed under the 2000 call for proposals, but unfortunately most part of the web sites were unreachable.
Another interesting initiative is the Database maintained by the Observatoire des Ressources Multimédia en Éducation ORME, the body that monitors the use of multimedia resources in education (http://www.orme-multimedia.org/).
In the private sector there are an estimated 100 e-learning companies in France. Although most French e-learning companies were created only last year, some are actually traditional employee-training companies that have made the jump to the Net.

[15] Conservatoire Nationale des Arts et des Métier
[16] Greta are Continous Training Centres from the Ministère de l'Éducation Nationale
[17] Centre Nationale de Èducation à Distance
[18] Campus Electronique

2.4 Italy

Only three years ago Ana Dias (2000) wrote a description of the online education domain in Italy.

"In 1990, the Ministry for the University and for Scientific Research and Development[19] promoted the creation of the NETTUNO network, for the implementation of Distance University courses. A consortium of universities, enterprises and other institutions composed this network. Politecnico de Milano, Politecnico di Torino, Università di Roma, RAI, Trainet (a Telecom Itália Training company) all have largely contributed to the development of online education in Italy.

Furthermore, several other institutions are enriching the online education field in Italy, schools are networking and providing online facilities like the "house of knowledge"[20], a collaborative and distributed learning environment designed for teachers and students.

In a regional context there are also important experiences. The Emilia Romagna Region has put forward a plan designed by SINFORM[21] for the setting up of a "Resources Centre for Multimedia Education & Open Distance Learning". Today, the Resources Centre for the ODL is a reference point at regional level for experimentation and dissemination of training schemes based on the methodology of the ODL and is aimed at the utilisation of multimedia material.

Besides national programmes and projects, European projects have largely contributed to the development of online education in Italy; face-to-face universities, companies, training centres are moving as fast as the information and communication technology demands."

Today things have evolved and the e-learning market is alive.

The conference "*e-Learning: state of the art and future development*" organised by ANEE[22] last April 2002, with the participation of the Ministry for Innovation and Technology (Ministero per l'Innovazione e le Tecnologie - MIT), concluded the following:

- Three out of four enterprises are planning to invest in e-learning solutions for training
- E-learning can not be planned within organisations without complete reorganisation of knowledge management
- The E-learning market is increasing 140% per year
- Enterprises, Public Administration and Schools are the sectors in which e-Learning will have a strong impact
- The Italian Government is heavily investing in e-learning initiatives for the Public Administration both at central and peripheral level.
- Important Italian Universities like the Politecnico di Milan or Bocconi are creating alliances with private Industry to develop common actions. These common actions go beyond a relationship customer-service provider since planning is done by both partner involved.

[19] Ministero dell'Universitá e della Ricerca Scientifica e Tecnologica
[20] Albergo della Conoscenza
[21] Sinergie per la Formazione
[22] Association of Electronic of Multimedia Services and Content, www

2.5 Greece

Ana Dias (2000) wrote: "Greece, like the other Southern European countries, participates in different European pilot projects, but besides that, there is a low participation rate of Universities, Technical Education Institutes, Training Centres and Enterprises in the online education field.

Located in Greece, the European Centre for the Development of Vocational Training (CEDEFOP) has been involved, since 1976, in the promotion and development of vocational training for young people, and the continuing training of adults, primarily through European-wide co-ordination of analysis and research activities.

Today, this Centre represents the principal knowledge base on this subject, having published hundreds of reports and sponsored research in all Community member states.

Within CEDEFOP, the European Electronic Training Village is a site dedicated to bringing experts in the field of Vocational Training together to share the latest information available. The electronic training village is an electronic resource centre (the users can download and read free publications, search lists on web sites by topic to find just the site you need, access bibliographical databases, the European Research Directory, the Terminological Database and the Institutional Database). In the words of CEDEFOP's Director, Mr. Johan Van Rens, "The Electronic Training Village facilitates the flow of information amongst and between policy makers, researchers and practitioners in vocational education and training throughout Europe and beyond. Its aim is to stimulate communication, interaction and debate on the development of vocational training policy, practice and research."

Today the Greek School Network (http://www.sch.gr/index_en.php), put the country's schoolchildren and educators in touch with each other and with resources all over the world. The schools are riding on the digital rails of the Greek Research and Technology Network (GRNET) (http://www.grnet.gr/index_en.html), created under the auspices of the Ministry of Development's General Secretariat for Research and Technology (http://www.gsrt.gr/html/eng/index.html) to interconnect Greece's academic and research community.

Some good practices examples are being carried out among Universities and Scientific organisations, for instance at the Athens Medical School, a group of students take notes as they follow an operation being carried out at the Areteion hospital some kilometres away. The procedure is being broadcast live on an audiovisual screen in the central library of the National Technical University of Athens (NTUA) (http://www.ntua.gr/en_index.htm) , where a computer-savvy generation is reaping the multiple benefits of e-learning.

The NTUA in collaboration with Athens University (www.uoa.gr/home.htm) and the Athens School of Economics and Business (http://www.aueb.gr/gb/main.html), has brought higher learning into the 21st century with the establishment of tele-teaching theatres at all three institutions. Professor Basil Maglaris, head of the e-learning programme at NTUA, noted that e-learning was especially useful for the medical field as practitioners are able to learn the latest techniques by actually viewing an operation online as well as offer tele-diagnosis services. Tele-diagnosis (http://tie.telemed.org/biblio/) is a crucial development for Greece considering the large number of communities living on remote Islands and in isolated mountainous areas. Furthermore, e-learning is allowing students to come into contact with students and academics at institutions within Greece and around the world.

Main problem for the institutions is the lack of the financial support, which means that development of the site and its contents is an individual effort and consequently slow.
We found that most of the websites of the institutions, universities, and firms were in Greek; this was a barrier to our investigation. In general we can say that there is just a small number of institutions applying real LMS systems, and also from these reason there was just a small response on our project.
From the small number of interested institutions there were some so busy that it was simply impossible for them to carry the interview even at the phone.

3. Institutions and LMS experiences

In the analysis presented in this chapter several types of institutions are analysed, from Private Companies, to Enterprise Associations, Training Centres and Universities. The Institutions are presented by alphabetic order, within the countries Portugal, Spain, France, Italy and Greece.

The institutions interviewed were ranging from companies to non-profit organizations and Universities.

Table 4. Institutions sorted by Country

Name of Institution	URL of Institution	Country	Type of Institution
Academia Global	www.academiaglobal.com	Portugal	Private Company
Associação Empresarial Portuguesa	www.aeportugal.pt	Portugal	Private Non-Profit Association
Associação Portuguesa de Segurança Social	www.seg-social.pt/profisss	Portugal	Private Non-Profit Association
Digito/Evolui	www.evolui.com	Portugal	Private Company
Instituto de Soldadura e Qualidade	www.institutovirtual.pt	Portugal	Non-Profit Private Institution
Pt Inovação	www.ptinovacao.pt	Portugal	Private Company
Universidade Católica Portuguesa	www.esb.ucp.pt	Portugal	Private University
Universidade de Aveiro	www.ua.pt and www.unave.ua.pt	Portugal	Public University
Universidad de Vigo	www.uvigo.es	Spain	University
Anonymous	www.esperienze.net	Italy	Anonymous
Ifoa	www.ifoa.it	Italy	Non Profit organisation
Profingest	www.profingest.it	Italy	Non Profit - Consortium
Sinform	www.odl.net/default.asp	Italy	Non Profit - Training Organisation
Università Cattolica del Sacro Cuore	www3.unicatt.it/unicattolica	Italy	University
University of Trento	www.didatticaonline.unitn.it	Italy	University
CNED – Centre Nationale de Education a Distance	www.cned.fr	France	Education/ Public Institution
Université de Bourgogne	www.u-bourgogne.fr	France	University
Université La Sorbonne Nouvelle Paris III	www.tele3.net	France	University
Université Paul Valery – Montepillier III	www.univ-montp3.fr	France	University
The Aristotle University of Thessaloniki	www.csd.auth.gr/information/department.en.php	Greece	University

From table 4 we can observe a total of 3 private companies, 6 non –profit institutions (training organisations), 8 public universities, 1 private university, 1 public institution in the education field and 1 anonymous institution.

Do to its characteristics we have grouped all the public and private universities, together with the public education institution in a University group.

Table 5 Type of organisation and frequency

Type of organisation	Frequency
University	10
Private Companies	3
Non-Profit Institutions (training)	6
Anonymous	1

Table 6 bellow shows in detail the information about the surveyed institutions sorted by LMS used. Interviews include 11 self developed LMSs and 10 commercially available LMSs. From the commercially available LMSs in use, 4 Institutions use Web – CT (3 are Universities), 2 other Institutions use Blackboard, 2 other use Learning Space and one institution uses Docent and another institution uses Intralearn.
Table 6 shows that 8 of the 21 interviewees institutions know or had experiences with other LMS besides the one in use currently.
There are a total of 561 online courses that are using the 16 LMS systems. Important is to note that 4 institutions have from 1 to 3 courses, 7 institutions have from 4 to 15 courses and only 10 have from 16 to 85 courses. These mean that 50% of the researched institutions have less then 15 courses online.
There are a total of 470 online tutors and a total of 41296 only students. Please note that teachers and students number is counted according to the number of years the system is in use (from one year to seven years) and according to the duration of the courses (duration varies from 25 minutes courses, to 30 - 60 hours courses, and 2-7 months, one semester, 2 years or 4 years courses). Another observation is that some institutions were not able to identify exactly how many only students (and some times teachers) they have.
In summary, in the 21 institutions studied there are 16 LMSs in use (11 are self developed and 5 are commercially available systems), 561 online courses, 470 online tutors and 41.296 online students.

Table 6. Information about Surveyed Institutions Sorted by LMS

Name of Institution	LMS	Other LMS	# Online Courses	# Online Tutors	# Online Students	# Years in Use	Typical Course Duration
Associação Empresarial Portuguesa	aep e-cursos	-	30	12	500	4	30 hours
Profingest	Blackboard 5	-	12	26	300	2	2 years MBA 4 months (7 units courses)
Università la Cattolica del Sacro Cuore	Blackboard	Decus System		-	-	2	
Sinform	Docent	Greenteam	3	11	160	2	1 year
University of Vigo	Elias	Simulnet	18	38	55	2	1 year
Anonymous	Esperienze	Web-ct Docent Intralearn	1	6	150	1	4 months
Digito/Evolui	EvoluiTech	-	80	45	12500	5	1 month
PT Inovação	Formare	-	10	8	1121	6	13 days
Sinform	Greenteam	Docent	7	6	140	8	2-7 months
Aristotles University of Thessaloniki	In house developed	-	1	-	180	1,5	6 months
CNED	In house developed	-	-	-	-	7	Vary
Academia Global	Intralearn&Centra	Docent Saba	70	15	1500	1	25 minutes
IFOA	L'aula virtual	-	85	50	2200	6	2 years MBA 40 hours - other courses
Instituto de Soldadura e Qualidade	Learning Space	aep e-cursos Saba	15	12	750	2	1-2 months
Université de Bourgogne	Learning Space	-	6	3	60	1	1 year
University of Trento	Proprietary	-	50	10	15000	1	1 semester
Universidade Católica Portuguesa	TWT – teaching Web Toolkit	-	14	10	120	4	40-60 hours
Associação Portuguesa de Segurança Social	Web-Ct	-	49	6	360	3	22-75 hours
Universidade de Aveiro	Web-Ct	Aulanet	80 University 17 Unave	80 university 11 Unave	4500 University 500 Unave	5	1-2 months 40-50hours and 80-100 hours

Name of Institution	LMS	Other LMS	# Online Courses	# Online Tutors	# Online Students	# Years in Use	Typical Course Duration
Université la Sorbonne Nouvelle Paris III	Web-Ct	-	3	100	1200	1	4 years
Université Paul Valery Montpellier III	Web-Ct	-	10	20	10% of the University Students	2	-

4. Course Development Tools

Course creation is generally observed as a main facility to the LMS. However, the answers to this part of the interview show different tendencies: i) LMS are accessible environments to course creation; ii) LMS are mainly a form of support and sharing of information; iii) LMS show difficulties which leads to the use of different or external tools and the involvement of production experts. A particular situation is observed in a self-developed system that is based in a flexible strategy that promotes the integration of new tools according the needs and the course design.

LMS are accessible environments to course creation:

"It is a simple and accessible environment. The content can be downloaded on the platform by the trainers, using any tool. Following a patterned structure from the guide, the trainer can create a course, session to session and propose it to AEP"

To some interviewees LMS are mainly a form of support and sharing of information:

"WebCT is a form of support, sharing information and communication.
It is not seen as a system for the development of the course." (Universidade de Aveiro: Web-CT)

Some institutions need to use external tools to the LMS and specialist support to course production, also suggesting that difficulties are based not in the platform but in the process of implementation:

"INTRALEARN tool is somewhat debilitated and should be complemented with other tools and/or applications that generate content onto the web." (Academia Global: IntraLearn)

Some self-developed systems are based in a flexible approach to course design.

"We could say that CNED has one basic system that allows new tools / elements to be added according to current needs, it is flexible, but problems always occur there. The creation of the courses is actually a joint work of CNED that provides know how, methodology, its expertise in distance education as such, in the work with various tools and on the other hand there is a institution e.g. university that import the content of the course. Usually when there is a course to be created the CNED examines if the tool of the institution could be useful or if the CNED should search for something new in order to provide according to best possibilities." (CNED: Self-developed)

On the whole the different platforms in use allow the didactic processes flexibility being rather, for some institutions, a main concern in the organization and development of the courses in the domain of the accessibility and interaction of the contents. One of them refers in particular to the adaptation of the forum to

the flexibility of the learning processes. For other institutions the integration in the various media is the means of didactic flexibility.

"The system used doesn't impose or privilege any pedagogical approach. It's a flexible system that allows different approaches. The focus is the possibility of designing activities with the students supported by the LMS."

The role of the forum to the development of didactic flexibility:

"The use of Web-Ct introduced a set of conditioning elements that had to be managed internally.

For example, it was concluded that the chat didn't bring anything of value to the pedagogical relationship with the students.

The forum, on the other hand, became a set of reflective and advantageous discussions. Therefore, the material produced in the Forum became the pedagogical material and synthesis of material and themes.

In this phase of creating material the software showed some inflexibility because it was necessary to have HTML in order to download the content/material for the e-learning platform. Regarding didactic flexibility the software corresponded to the needs."

The importance of multimedia and audio and videoconference services:

All formats are admissible as long as they're, let's say, video, audio, normal text, normal images, charts. The system has a description system in XML. The user has limits regarding sufficient bandwidth, but the system itself doesn't have any limitations. (Prodígio: EvoluiTech)

In the teacher user-friendliness domain the answers point out different conceptions and strategies followed by the institutions. A former group refers that the platforms are clearly user-friendly and also suggests that the design of the system will allow its intuitive usage, eventually with the help of helping systems, which promote the autonomy of the user. The second group establishes the necessity of trainers' training to use LMS, and the third introduces the distinction between the roles of content expert and tutor, as a strategy to overcome the constraints of the familiarization with LMS.

"Very easy, the trainers that work with us have no specialty in computers; they're traditional trainers, who have easily constructed the content without any problem."

"Our teachers who are also the tutors had no problems in using the LMS. For the most part they have found Blackboard to be very easy to use. In their opinion they can do more than before with our previous product. Valuable content development remains time consuming independently from what LMS you use."

The need of previous and/or continuing training:

"It's not perfect, a 4 on a scale from 1 to 5 ... there is no formal training for the teachers... the best practices is shared amongst the teachers, some workshops... Normally, a full day session, addressed to people with no experience as a user. The first part is an explanation of what has been done and a demonstration is given, and the second part is practical where the people use the tool.

Afterwards, direct help is given to the teacher whenever he/she requires it...

A team of students called techno-rangers was created, which works on a 'call' basis."

Some institutions introduce the distinction between the roles of the content expert (teacher) and the tutor, the later as the one that manage the course development and implementation:

"We distinguish content expert and tutor. There is no "Teacher" in a traditional sense. Content expert participate in course development following a top-down approach. They supervise content and reply to answers posed in the forum but all their input is mediated via the tutor. It is the tutor who uses the LMS directly not the content expert.

The use of different media is a facility present in the generality of the platforms, in spite of its use not being usual, especially at the video level, having in mind the limitations of the pre-existing bands.
It supports the integration of multimedia elements. Metadata for multimedia elements.
Some institutions do not use audio or video but are planning to introduce them:
"At the moment the LMS does not support audio, video or moving images but IFOA is analysing some existing products to be eventually integrated into the existing system."
Some institutions do not use audio and video:
"The system used is good for text mode, acceptable for images; it doesn't support video or audio. Even though such resources are available for downloading, the system is not oriented to support audio or video in a broader sense."
Other institutions area cautious about the use of multimedia:
"Yes it does, but at this moment we are not using audio and video in training, due to technical deficiencies in the students' and country's computers. The students don't have computers with these characteristics, but the platform has it."
"No – we prefer not to load-up heavy content in order to facilitate those students who only have minimum software and hardware."

Questioning and assessment are facilities of the LMS used by the institutions of this study. However, these facilities have different ways to support student learning through the feedback offered to the user by the system/ tutor. One case of enriching feedback deserves a particular reference as it includes the development of a database of student's interventions and comments presented as practical course applications. Another institution made the conceptual distinction between informal and formal assessment. The first one is included in the LMS and the later to the process of traditional in house final course examination.
"It's possible to create self-assessment questionnaires, as well as generate precedents. It is also possible to create work groups, generate questionnaires for final assessments without the student receiving any immediate feedback, given that it's possible to create open questions."
"The system includes a module for the creation and exploration of questionnaires with multiple answers.
In a broader assessment context, it supports an approach by project, problem solving, exploration of virtual laboratories (field of chemistry, physics), not up for discussion, publication of work."
Some LMS use external tools to provide questioning and assessment facilities:
"We use automatic test batteries for formative and summative assessment. This software is not a *Greenteam* product but was integrated later. The product used is *Academy*.
Other institution use a final course examination:
"We have to distinguish between two types of assessment we use: informal assessment and formal assessment. The first is built in the course structure

through case studies to be developed by the students. The second one is never on-line but is done through traditional exams to be taken in house."

Another institution uses not only the tutor feedback but plan to introduce previous interventions and comments of students as a practical course application:

"The trainer has various question formats: multiple answer questions, correspondence questions, open-answer questions. Everything the user/student sends is corrected automatically, facing the correct answers stored in the server, and the system attributes a grade to the student right away. Everything that is an open-answer goes to the server area and the trainer checks every day the answers he/she must correct in order to give a grade. All open questions that require a jury or if that need to be evaluated by a trainer are sent by the trainer via web. That grade is then put together to the one given at the time in order to calculate the final grade. Another thing we are doing now is re-finding content from the students... We save the interventions given by the students in each course, but we had never done anything with this before... We are now doing something..., as a way to enrich the courses, we are using the students' interventions, descriptions made by them, exchange of comments, things of the sort... and we present it as practical course applications..."

5. Student support tools

The facilities of interaction available by LMS are shown, generally, by the fora, chat mailing lists and email, having to bear in mind that not all the interviewed institutions use the so called services. Some have adopted a pedagogical model which discourages the use of the services of chat communication. Others include videoconference and collaborative technologies based on video streaming. In one case, the strategy of development of the interaction still includes the promotion of the system control by the learner with the possibility of the learners being able to edit pages or even to create fora.

Interactivity possibilities based in fora, chat and email services:

The type of student support resource existent for communication is the forum, the chat room, the identification of a virtual class (that allows the sending and exchange of e-mails) and a document area (that allows the placement of documents for the virtual room). During training the students can share work documents or other documents that have to do with training, and it's possible to not only send work or practical cases to the trainer but also to the virtual class, thus sharing work documents.

Others also includes videoconference and video streaming technology:

Various possibilities as chat, videoconferences, WebCT supports discussions.

We integrated collaborative technologies (video streaming) using both life and traditional video lessons. The first connects the director and the orchestra. Email (all-tutor). Forum (all –tutor).

Some institutions follow a pedagogical model that discourages the use of the synchronous communications:

In *fora*. The institution doesn't encourage the use of synchronous communication. Chats are not used frequently, synchronous tools are not promoted... the platform allows it, but they are not used often.

One institution following an asynchronous strategy also encourage student control over the system:

The students may have control over the system at various levels. They can be managers/creators of part of the course, and can create pages, fora, *etc... but the basic idea is to participate in mailing lists, participate in* fora, *post content, publish pages...*

At the student to student communication level two tendencies stand out: i) the simultaneous usage of the communication synchronic and asynchronic services; ii) the preferential usage of the usage of asynchronic communication. Two cases are still referred of not using the communication services student to student.
Both services of synchronous and asynchronous communication based in fora and chat:
In synchronous terms it supports chat. There is no audio or video conference. In asynchronous and formal terms, it supports fora. *It should be noted that the management of* fora, *as well as other page models can be given to students.*
Some institutions develop the pedagogical model based in asynchronous communications
It is mainly asynchronous communication although there are cases with the synchronise communication but it is quite rare. The CNED does use e-mails, chat, videoconferences, phone calls. It depends always on the student possibilities.
Others are based in synchronous communication services:
The ELIAS platform is synchronous, forum and e-mail is available.

In the communication learner tutor two modes stand out globally, synchronic and asynchronic, respectively chat and forum, discussion lists and email. However, email is the modality more frequently stressed to enter in contact with the institution being still referred, in one case the discussion list for the contact with the institution. Theses services are available 24 hours a day. The availability for the communication learner tutor or institution includes the use of the telephone especially during the period of the activities.
Online student to tutor/institution synchronous and asynchronous communications:
Student and trainer communication is established in a synchronous and asynchronous way through four instruments (forum, chat, document zone, virtual room, questioning area). Regarding the institution e-mail is the only communication system in the platform.
Or asynchronous communication, i.e. email, to student tutor/institution communication:
email student – tutor. Tutors are available during the office hours. The presence of an additional technical tutor is guaranteed during videoconference lessons. For this purpose students have to join the class in a place which was equipped with all ITC tools required for effective video streaming.
Other institutions use mailing lists to student institution communication
The LMS privileges student to tutor communication. Institution communication has access to mailing lists by course, but the more administrative fluxes don't go through the system. The more administrative fluxes are implemented in a more traditional way.
Some institutions use 24h telephone line as a communication resource
Relatively to 24h access to the service, this is a reality, a permanent support telephone line functions beyond the normal working hours.

Student facilities concerning library resources and online references are presented as follow:
Access to online documents, references or a resource centre:
At this moment there is no library on-line, the students have access to a set of documents that are made available in the work area of the course.
Or an online library:
There's a Library space on the Platform. This library is general to all courses on the platform. By course, there is also an organisation of reference and resources.
Links to online references:
...the course has bibliographical references online and within each module there's reference to books or publications that aren't online.
Some institutions also offer a course book.
Documentation services are well organised, and have various services available on-line.
Regarding UNAVE the basic work material is a commercial book.
Other comments:
..they are limited. But, we see it, not as a limitation of the system but of the resources. If the library had a digital service, this interlink would be natural and evident... we believe those services should be supplied by the libraries so they can be integrated by the LMS.

From the answers given by the interviewed institutions we may consider two types of feedback: one is automatic and build up in the system and other is made by the tutor. The first type of feedback is immediate, since the student finish is work. However, there are few systems with this type of feedback facilities. The most usual form of feedback is given by tutors and varies from 24h to the maximum of 7 days (in a specific case of a doctorate course).
Automatic feedback:
Automatic feedback is provided by the system in reply to self-testing, and feedback coming from the tutor is provided when the tracking system shows that the student does not make any progress.
Time feedback that varies according the type of the course and the student tutor communication system used:
It depends on each tutor/trainer... it is up to them... but that weakness exists at a presence level... there is no system that guarantees quality that can contribute to the fulfilment of the goals: time for response, level of use, quality of interactions, quality of activity design, etc...
When we speak of e-learning [Note Pedro Pimenta: e-learning is understood as learning only supported by electronic means], these systems will be necessary...
Or from 1 to 7 days:
For a doctorate programme the time for response is acceptable. The teachers' responses take from 1 to 7 days. The system does not advise the student. (Universidade de Vigo: Elias)

6. Tutor Support tools

There is evidence from the data collected that not all LMS have facilities to monitor student's performance, or when founded it is not enough for tutors' task. The answers show that tracking facilities mostly address quantitative register of presence in the training area of the LMS, forum or chat. Also student administrative and background data is not directly accessible to tutors who need to made specific query to the system administrator in order to get it.

Some interviewees identify facilities of student tracking with or the support of the system administrator.
All trainers have access to their group of students, they have access to the identification of the students' presence in the training area of the platform; they have access to what goes on in the chat room. The students' tracking has to be solicited by the professor to the management of the training centre.
To others tracking procedures are made by tutors:
Tutors can track students via the LMS. Monitoring is mostly done through computer based assessment linked to specific databases. Personal data, test results and other forms of assessment get stored and are retrievable at any time.
In some cases is used an external database associated with the LMS.
Web-ct allows it, but the identification of the students is, in our case, done through a separate database. In the online tutoring mode monitoring is done by the tutors and by the course coordination. Tracking of students is done by the institution, which informs the tutors.
Other LMS do not give tutor access to student data:
The platform doesn't have any monitoring tool. The teacher can analyse the answers to the evaluation questionnaires. The students' data is stored in a database but the platform doesn't support its manipulation.
Others comments:
This is not done through the LMS. This is the job of the institutes to monitor the situation, manage the contacts between all stakeholders, to be prepared to answer on any requests. They are responsible for registration that means they have the whole overview of the students' portfolio, they usually receive the assignments from the students in order to see if they are fulfilling the required criteria for further studies.

We get a few direct answers to the question related to group management tools (how the LMS deals with the tutors facilities to manage group of students), especially to the group creation facilities. From the data collected management is made in the course of forum: However, there is a case of self-developed LMS where is identified an agent to guide group activities.
With group creation and management facilities:
The basic element is the group. Each course has a group. The teacher can add or remove students, send information, etc. .
Without group creation or management facilities:
There are no automatic facilities to make up groups of students.
Group management facilities identified with fora, chat and email:
Place tasks and communicate through e-mail with each work group. It can also launch specific *fora.*
An agent to guide group activities.
Teacher does not guide the groups but there is an " Angel " that helps the students by any problem. It works like the Angel appears and answers on the questions, always present and available; it is an internal part of the system.

Mostly LMS have a questionnaire generator and it is used by tutors. However, some answers indicate that they are not user friendly or accessible to tutors. To others situations questionnaires are prepared externally and displayed in fora.
Questionnaire generator integrated in the LMS:
There is the automatic generator of questionnaires in the platform. Regarding the availability of work and practical cases insertion is done by session. To insert

session content there is a specific field in order to compose practical work on the case study.
Some interviewees identify user friendly problems
That is in the system but it's not exactly given to the trainers because we think that they would not use it or would need a lot of preparation to use it...
Questionnaires prepared externally and displayed in fora
Questions can not be prepared automatically via some LMS specific publisher but are developed separately by the teacher. These test can be then downloaded by the student. The transfer of these files is done by the tutors via the tools provided by the platform.

The collected data evidence a general lack of integrated tools to monitor and plan student progress. Exception was presented by two institutions whose LMS have dedicated tools to register and edit the student path.
Otherwise, this function is accomplished through the questionnaires, assignments or, in one case, the working diary. Another pedagogical approach suggested by institutions to monitor students' progress is based in the register of presence in fora.
LMS with integrated tools to register student progress:
It contains a set of progress reports. There's the possibility to create various types of reports. The student's whole path is registered.
The tutor can edit progress by student or by course.
LMS without specific integrated tools:
The trainer doesn't have access to automatic tools; he/she must ask management.
The trainer receives the work directly from the students, but it has nothing to do with the platform.
Through questionnaires and assignments:
The evolution of the student can be monitored, regarding his/her progress in the foreseen training plan, at any time.
Or fora activities:
The tutors monitor through the answers given by the student in the fora. Through messages read and answered by the student. The register of pages accessed by the students.

Data evidence the lack of specific tools to provide administrative communication between tutor and institution. Generally, administrative communication was done independently of the platform through external tools. Only one institution identifies these facilities in the LMS that they use, however without comments to the user-friendly level of this tool. The answers evidence a current tendency to the absence of these tools in the LMS and the need to develop it in the next future.
Some institutions identify tutor institution communication facilities in the LMS, although not used intensively:
The LMS allows teacher/institution communication. For coordination a helpdesk is used, and normal electronic mail.
Others do not have tutor institution communication facilities integrated in the LMS
There is no specific part of the platform that makes tutors communicates with the: administration. Any communication of this kind is done "out-side" the platform.

7. Administration Aspects

This section refers to general administration; students enrolment, fees payment, user and password management, student and examination records, and general teacher/student/course allocation.

Enrolment procedures and fee paying are made in quite different ways. The site / LMS of the institutions usually provide some information on the available courses, fees, etc... In this way, some preliminary contacts ("Pre-enrolment") might be facilitated by the LMS. In general, formal enrolment and fee paying is done outside the LMS. In some training companies or state services, enrolment might be made using the LMS, but payment is processed off-line (secretary, check, etc...). Only one of the institutions has declared to have the full process supported by the LMS.
There are contradictory expectancies; although, in some way (... ***still, lacking , not yet, it is planned***...), some users mentioned the fact the payment should be / will be supported by the LMS, one other clearly stressed that the LMS should focus on teaching/learning activities, considering that administrative functions are out of the scope of the LMSs.

Concerning Passwords and security, in general, access to course content is granted based on login / password. Some LMS support both public and private areas. No one related any security problem. One person mentioned that the security strength is related to the operating system used. Some systems use a 'user' approach, and the username/password are provided to the 'student' / 'tutor'; one other mentioned that the password is associated to the course.

Although all the LMS claim to have, in some extent, a students database, the use is quite different; in some cases the database is not available or the institution "is not ready to use" it. Other situations includes tracking of the students behavior and/or quiz (closed-type questions) performance inside the system. One system has different databases for students and for tutors and teaching staff.
Some answers pointed out that users are, in same way, disappointed with the database extraction services.

"Examination", "evaluation", "formal assessment" are understood as formal processes, and the face to face model is followed. On-line students might be submitted to "formative" and/or "summative" assessments, for 'monitoring learning' purposes, and the issue of "participation certificates", based on students' activity inside the LMS is a generalized procedure.

Courses, teachers, classes is a 'design' subject. Some LMS have been designed to have some tutor/classes managerial facilities, some others don't. In the first case the LMS provides some 'scheduling' facilities, in the others the 'working perspective' is the course unit.
It seems a general trend that this facilities seem much more important for professional training institutions where (in general) courses are shorter, are "repeated", in several "editions", in short timelines, than in classical education institutions (universities), where the model adopted (longer, once a year) favors a more stable course / teacher / students association.

8. Technology Aspects

From the point of view of hw/sw, encountered systems seems to reflect the overall market situation; the majority of systems use Microsoft software (Windows 2000, NT), but some systems use Unix / Linux as the operating system. For traditional teaching institutions adopting LMS, the integration with other information systems is not a present concern; for institutions basing all their activity on the LMS the integration is already obtained or is considered prioritaire.

One interesting point is the fact that two interviews didn't knew what kind of hw/sw their LMS were using. This might be understood a positive tendency in terms of the opacity of technology; people are using technology without necessarily be aware of what kind of alternatives are being used, which might be a sign of the maturity of the technology.

A main concern of the eLearning providers seems to be the easy of use for the final user. All the answers mentioned the idea of 'minimum requirements' for Client hw/sw, using expressions as "*the client **only** needs*... ", or "***standard** equipment*...", "***basic** programs*", "***minimum** user requirements*", etc...
Concerning the hardware, some interviewees mentioned CD player and printers (beyond the 'standard'); in what concerns the software it is possible to separate it) the access to and navigation into the LMS and ii) the access to course contents; for i) 'standard' browsers are usually mentioned; for ii) several interviewees mentioned the necessity of having some plug-ins, being Acrobat explicitly mentioned.

One particular answer mentioned some other type of requisites; no hardware neither software, the need of an email account has been mentioned as a 'client' requisite.

The question of the flexibility of didactic structure got a very broad range of answers; some interviewees mentioned the fact of using or complying with standards (IMS, SCORM), others (probably because 'Flexibility' is seen as a positive thing, by itself), argued that '*the system is new*', or, in a very laconic way, "*It is adaptable*". Many interviewees argued that technological design and development had taken in consideration the importance of pedagogical freedom ("*pedagogical ... adaptation*", "*pedagogical strategy*").

In relation to Standards, interviewees stressed the absence of both 'de facto' and 'proposed', technical standards. Curiously, (only) one interviewee mentioned his/her belief that standardization will have a positive impact in internationalization of eLearning businesses; and, on the other hand, other person stated the complementary idea "*Since our courses are country specific, standards are not yet relevant*". The existence of standards is welcome, both for marketing reasons (as indicated before), but also for cost reduction ('rationalization of resources') or LMS migration.

The number of students is not considered an issue; many interviewees stressed the fact that their experience is relatively recent, or the number of students quite small; others mentioned systems is scalable. Only one person mentioned the fact of having one server for course contents management and delivery and another

for users' management. Another person mentioned the use of two servers, but for security reasons.

Some phrasing indicates that interviewees are aware that number of students might be a problem in the future; "*we are just at the beginning(...) no problems yet*", "*no problem until now*", "*just a small number of students ... yet*", "*up to now...*", and, in some way, in are foreseeing the question.

In general, access to the LMS is through Internet, and the speed of the system depends on the limits of bandwidth available for each user. Users are accepting this situation as satisfactory, except two interviewees; one uses video contents on their courses, and the other has a large experience in corporations with their own network.

9. Economic Issues

Interviewees have been conducted in a broad range of institutions; from Universities to professional training companies, and the answers on these questions reflect this diversity. Given the fast evolution of these products, and the correspondent fast obsolence, providers prefer a cost structure based on annual fees than based of 'price'. Commercial and/or well-established LMS have substantial costs, and again here two main cost structures are present; one-year license ranging from $5000[23] to 40000/60000 €, independent of the number of users, or licenses based on the number of users, with a cost of 30 € for each student. The institutions which have developed or are developing their own LMS don't mention the 'cost', or express the developing / maintenance costs in terms of people allocated (1 technician full time). One University is using a open source product with buying cost zero.

Student fees issue relates directly to the course undertaken, not the platform used. Companies working in the area of short time, vocational training, mentioned student fees in the range 175 €-200 €. One University, which uses an LMS for doctoral programs, mentioned a initial fee of 1250€ plus 800 € per year. In the cases where the LMS has a cost per user, the institutions include it on the course price of - mainly Universities - offer the LMS as complementary service to teachers and students, without any fee directly linked to the LMS use.

Many interviewees mentioned that is hard to identify the staff support and costs. However, those who gave objective values, converged for a team of around 2~3 people full-time (technicians plus help desk), plus a variable size support team depending on the number of users who need help.

Teachers / tutors usually require some initial training in using LMS. In some cases teachers are well acquainted with technology, and formal training does not take place, in other cases, formal actions are planned, and some interviewees mentioned blended learning practices, as one day face-to-face plus 15 days at distance. Some interviewees stressed the fact the people needing support in learning how to work with LMS are teachers, since the LMS interface for students follows the web standards, and, thus, students don't need help in using the LMS. In the case of blended learning, the first, face-to-face session, is used by

[23] around 5000 €, July 2002

the teachers / tutors to show to the students the functionalities of the LMS, and this is considered enough for the rest of the course activities.

10. Overall evaluation

Interviews analysis led us to find that in general the e-Learning managers are satisfied with the solutions they bought or developed.

All Web-Ct users declared they were satisfied with Web-CT. One has pointed out difficulties with the English language and another considered the interface very poor.

Blackboard users are satisfied and hope the Italian version will come out to the market very soon.

Learning Space is considered good, stable and intuitive. Interviewees pointed out that the assessment aspect is not very well constructed.

Some of Docent users would appreciate that the handbooks was not in English, but translated. Furthermore the graphical impact was considered of Docent is not very attractive.

Intralearn users considered it a program of good quality and flexible. They stated that the system was better than Learning Space or *Formare*, but worse than Docent or SABA.

Concerning the self developed systems the majority of the interviewees are satisfied with own systems. Most part of the interviewees were able to point out some major difficulties and some improvements they would like to introduce in their own developed systems.

Some own developed platforms are very successful and are selling e-Learning solutions to other Institutions.

"...it is a national system, developed according to the practice and experience of e-learning, maybe that can be considered the secret to its user-friendliness and success in the increase of the number of clients in 2001 and 2002 (currently there are 17 institutions using the system in Portugal)."

Other own developed systems are satisfied with their LMS features, but they are not able to put Multimedia on the web due to the general technological network.

In relation to trainers it was stated that trainers can put all kinds of contents in the system, but possibly the LMS could integrate some other trainers facilities, especially related to students monitoring.

One University that developed its own system declared that there are other factors that limit the use of LMS:

"There is no institutional strategy, it is a bottom-up initiative, but it would be useful if it were top-down... the initiative is facilitated and accepted, but there is no strategic dimension..."

Another University supports previous declarations:

"The experience is good and surpasses the expectations. The most important is lacking... The institution dedicates very little to virtual education. The only thing that the University acknowledges is the dedication of the teacher, counting it as a school year activity and thus valid for curricular reasons."

In summary we can say that Commercially available platforms can be very practical to start with but they have problems with linguistic issues, as well as with assessment tools adequacy to target groups.

Own developed systems are simpler and directly related to the target groups; they surpass the linguistic problems of the commercially available platforms and are constantly updated, being able to improve their features according to trainers, trainees and administration evolution. Besides the linguistic advantage national

marketing strategies together with competitive pricing contribute to the great use of those own developed LMSs.
Another important issue is the Universities e-Learning managers concern with the University policy and strategies for this field. Apparently Southern European Universities are note dedicating enough importance and attention to this subject.

11. Future Features to include in LMSs

Content management and content development tools are major concern for all interviewees.
"Enrich content: multimedia, and knowledge management. Content flexibility."

"It's necessary to improve the content management databases. There is software that only manages content that can be incorporated."
A general concern for the e-Learning managers is related with the management of competencies, including the integration between training management and human resources management. Interviewees declared also their concern with the administration and monitoring of students, courses and contents, as well as with the use of better assessment tools.
"Integrated management of all management/organisation mechanisms of the course, mainly in a dematerialised environment of a course, in the perspective of the system administrator, so as to allow a global reading of the course.
Integrated management system capable of monitoring."

"Students data bases, further group management tools to better divide users, better articulated statistics (one per class, alphabetic order); the possibility to work directly on course development without the need of using dream river."

Other institutions have great concerns with the Teachers training.

Didactic flexibility and online retrieval of library resources are also concerns pointed out by interviewees.

".. without losing the current perspective of flexibility, it would be interesting to have pre-defined models of structured pedagogy... a case of methods, a problem-based learning, or other type of approach that has already been structured, etc...

"Integration with other systems; Support of different media...Standardization for the reuse of contents/activities... more in the perspective of activities...

Many institutions did not answer to this question, especially institutions from France, none of them have answered.

In summary, content management, didactic flexibility issues, including collaboration and group management and students management are the main concerns expressed on the interviews.

12. Conclusions

From the present research it is clear that the increasing number of Internet users in Southern Europe is pushing up the e-Learning market. There are more institutions, which have web presence and e-learning offer.
Besides the *e*Learning initiative of the European Commission seeks to mobilise the educational and cultural communities, as well as the economic and social players in Europe, in order to speed up changes in the education and training systems for Europe's move to a knowledge-based society.

Viviane Reding, Commissioner for Education and Culture stated
"The Member States of the European Union have decided to work together to harmonise their policies in the field of educational technology and share their experience. eLearning aims to support and coordinate their efforts and to accelerate the adaptation of education and training systems in Europe."
It is our conclusion from the present studies that Southern European institutions are on the write track to further develop the existing e-Learning offers.

Since the year 1998 we have observed the e-learning field evolution. Ana Dias (2000) wrote in the Cisaer final report:
" Online education in Portugal is a very unstructured domain, at both public and private level. In almost all analysed cases, the web courses provided are developed in the context of pilot projects, financed by the European Union and with a limited life span."
"Online education evolved rapidly in Spain and there are a large amount of face-to-face universities, training centres and private companies adopting this type of learning."
" In France, like in the rest of Europe, European pilot projects are responsible for a large part of the market movements."
"Besides national programmes and projects, European projects have largely contributed to the development of online education in Italy; "
"Greece, like the other Southern European countries, participates in different European pilot projects, but besides that, there is a low participation rate of Universities, Technical Education Institutes, Training Centres and Enterprises in the online education field. "
The present study shows evidences of an evolution of the institutions involved in e-Learning in Southern Europe.
The pilot projects are no longer dominating the e-Learning field in Southern Europe.
At present there is a tendency to organise and structure the e-Learning offer using a type of software somewhere classified has Learning Management System. Those systems are dedicated to some issues of the learning process, but in almost all the cases (commercially available systems or self developed) the systems are not able to perform all the activities the institutions need. Administration aspects, integration with existing software and content management are some of the issues not well treated by most part of the LMS studied.
Language is a main issue in Southern Europe and LMSs not translated to Countries languages can be easily unsuccessful.
Another interesting observation is the lake of a common understanding concerning terms and functionalities of the LMS systems.

The research also led us to observe that most part of the e-Learning managers assume a position of experimentation and initiation on the e-Learning process (50% of the researched institutions have less then 15 courses online).

Course creation is generally observed as a main facility to the LMS. However, the answers to this part of the interview show different tendencies: i) LMS are accessible environments to course creation; ii) LMS are mainly a form of support and sharing of information; iii) LMS show difficulties which leads to the use of different or external tools and the involvement of production experts.
To some interviewees LMS are mainly a form of support and sharing of information:
Some institutions need to use external tools to the LMS and specialist support to course production, also suggesting that difficulties are based not in the platform but in the process of implementation.
The student support tools available on the LMS are shown, generally, by the fora, chat mailing lists and email, having to bear in mind that not all the interviewed institutions use the so called services. Some have adopted a pedagogical model which discourages the use of the services of chat communication. Others include videoconference and collaborative technologies based on video streaming.

There is evidence from the data collected that not all LMS have facilities to monitor student's performance, or when founded it is not enough for tutors' task. Also student administrative and background data is not directly accessible to tutors who need to make specific queries to the system administrator in order to get it. Some interviewees identify facilities of student tracking with the support of the system administrator.
These observations lead us to conclude that in most part of the cases Teachers are note the ones who monitor the students.

It seems a general trend that the Administration facilities seem much more important for professional training institutions where (in general) courses are shorter, are "repeated", in several "editions", in short timelines, than in classical education institutions (universities), where the model adopted (longer, once a year) favors a more stable course / teacher / students association.

Concerning the technological aspects, in general, the access to the LMS is through Internet, and the speed of the system depends on the limits of bandwidth available for each user. Users are accepting this situation as satisfactory, except two interviewees; one uses video contents on their courses, and the other has a large experience in corporations with their own network.

Many interviewees mentioned that Economic aspects are hard to identify. However, those who gave objective values, converged for a staff team of around 2~3 people full-time (technicians plus help desk), plus a variable size support team depending on the number of users who need help. Teachers / tutors are also an additional cost, they usually require some initial training in using the LMS.

An overall evaluation allow us to observe that the commercially available platforms can be very practical to start with but they have problems with linguistic issues, as well as with assessment tools adequacy to target groups and pricing.

Own developed systems are simpler and directly related to the target groups; they surpass the linguistic problems of the commercially available platforms and are constantly updated, being able to improve their features according to trainers, trainees and administration evolution. Besides the linguistic advantage national marketing strategies together with competitive pricing contribute to the great use of those own developed LMSs.
Another important issue is the Universities e-Learning managers concern with the University policy and strategies for this field. Apparently Southern European Universities are note dedicating enough importance and attention to this subject.

Most part of the systems researched seams to have problems with content creation and content management, students monitoring and assessment tools. Online administration and integration with other institution software and platforms were also a question.

References

http://europa.eu.int/ - The European Union On-line

http://www.odci.gov/cia/publications/factbook/ - CIA World Factbook

The use of Learning Management Systems in North Western Europe

by

Desmond Keegan

Overview

This report is an analysis of in-depth interviews with systems managers of Learning Management Systems (LMSs) in North Western Europe:

Ireland	8
Great Britain	6
Northern Ireland	4

Country	Language	Geographical Area (sq.km.)	Population (millions)
Ireland	English	70282	3.6
Great Britain	English	227480	57.6
Northern Ireland	English	14120	1.6
Total	**English**	**311882**	**62.8**

Table 1. Demographical data on North Western Europe

This study focuses on the satisfaction or lack of satisfaction of institutions with the LMSs they have purchased or developed themselves. In the areas under consideration the term Virtual Learning Environment (VLE) is used more extensively than Learning Management System (LMS).

Background

The phenomenom of education and training on the World Wide Web is relatively recent. Collis, in her influential 1996 volume, *Tele-learning in a digital world: the future of distance learning*, places the first courses in late 1995.

After a first exploratory period the first LMSs started to appear and listings of them today by Brandon-Hall in the US and by Bruce Landon in Canada reach to over 100. Many of the LMSs presented in this study are not listed by either author.

Here is a generally-accepted diagram presentation of an LMS:

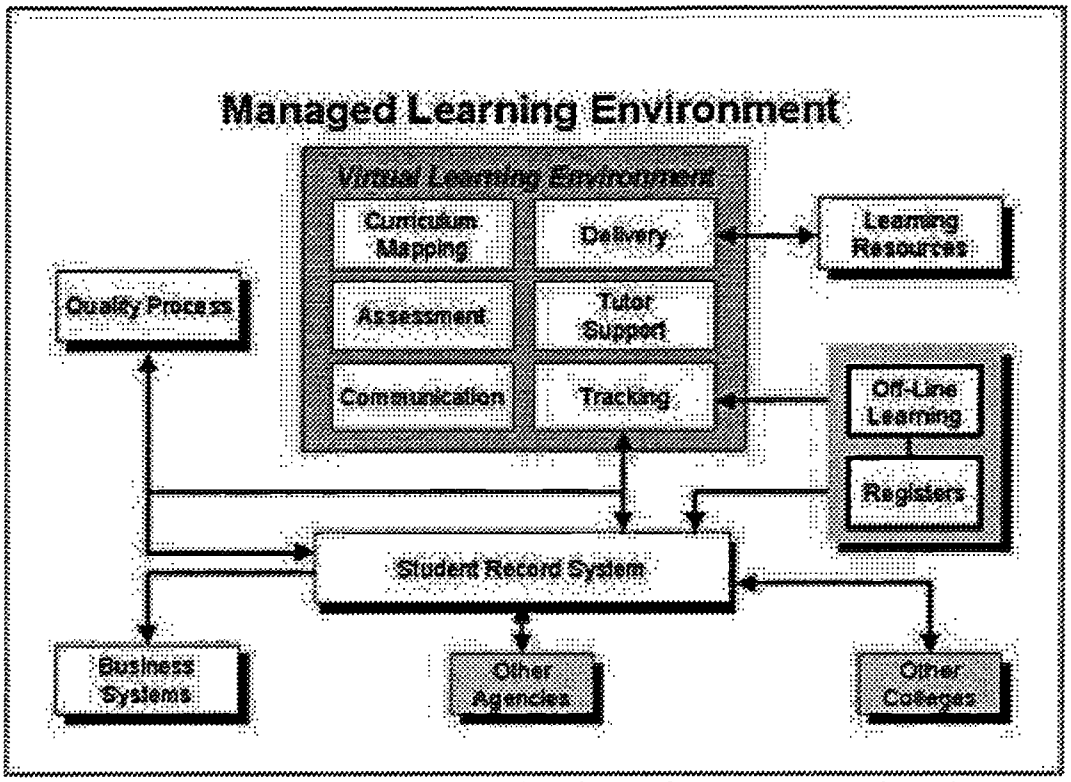

Figure 1. A generally accepted presentation of an LMS or MLE (managed learning environment)

Brandon-hall.com defines an LMS as "software that automates the administration of training events. An LMS registers users, tracks courses in a catalogue, and records data from learners; it also provides reports to management. An LMS is typically designed to handle courses by multiple publishers and multiple providers."

LMSs "allow a company to leverage the collective knowledge and skills of its workforce more strategically," according to WR Hambrecht and Co's report *2001 Outlook for the Learning Management System Market*. "In addition, an LMS

- provides the foundation to improve the speed and effectiveness of the training process,
- ensures that an enterprise is in compliance with relevant industry education standards
- enhances the efficiency of a company's supply chain through better product knowledge, and
- improves communication among and retention of employees during a business transformation process."

American forecasts calculate that about 60 percent of corporations will have an LMS platform deployed by 2003.

Selecting an LMS isn't something to be taken lightly. In all likelihood, the task will be lengthy, intricate, and costly. Considering the fact that most analysts agree that the life span of a typical LMS is only two years, it's crucial to be able to demonstrate the return on investment. WR Hambrecht and Co concludes that purchasing an e-learning infrastructure "involves a long decision-making process, extensive custom programming, and time-consuming installations. Our conversations with buyers of LMS products indicate that the high cost of switching

LMSs makes customers more loyal even when they're dissatisfied with certain elements of their LMS."
Here are the main qualities most current LMSs have, according to brandon-hall.com's report *Learning Management Systems 2001: How to Choose the Right System for Your Organization*:

Browser-based applications. Most of the new systems are 100 percent Web-based and use Java and server applets. The vast majority of LMSs let administrators and learners access performance data and reports using only a browser.

Authoring tools. Many systems offer Web-based, built-in authoring tools geared toward subject matter experts with authoring skills. Systems that don't have built-in authoring tools are designed to use standard, off-the-shelf tools such as *Flash, Authorware, Dreamweaver*, and *ToolBook.*

Assessment tools. Many LMS products offer tools to create tests and assessments. The data produced by the tools tends to be more system-compatible than data created by third-party applications. Similarly, 45 percent of the tools provide skill-gap analysis, showing an increasing trend toward using LMSs to monitor overall human performance.

Blended-learning capabilities. Classroom and e-learning management features such as classroom scheduling, enrollment, and wait listing are now included in most offerings.
Compliance with industry standards. Support of e-learning standards has become a priority among LMS suppliers. Fifty-two percent of products currently support Aviation Industry Computer-based training Committee standards; 75 percent indicate they'll support AICC; and 59 percent say they'll support metadata tagging specifications by 2002.

Larger implementations. The number of learners has grown substantially in the past four years. Suppliers say that the number of learners in their largest individual implementations is about 116,000, compared with approximately 39,000 learners in 1997.

Increased cost. Data shows that the cost of LMSs is risingdramatically. The average cost of a system supporting 8,000 learners over a five-year period is currently US$550,000.

Use of LMSs

The Learning Management Systems (LMSs) used by the institutions in this study were:

WebCT	6
TopClass	3
Blackboard	3
Ascot Systems Course Master	1
IT Campus	1
Intranets	1
Visit	1

Granada Learnwise	1
FDL Learning Environment	1

Table 2 lists the institutions of which the LMS System Manager was interviewed. Interviews were conducted with institutions in Finland and Italy as well, but these are not analysed here.

Institution	URL of Institution	Country	Type of institution
DEIS, Cork IT	www.cit.ie	Ireland	Institute of Tech
FAS	www.fas-netcollege.com	Ireland	Govt. Training Centre
Dublin IT	www.dit.ie	Ireland	Institute of Tech
Sligo IT	www.itsligo.ie	Ireland	Institute of Tech
Cork IT	www.cit.ie	Ireland	Institute of Tech
Manchester Metropolitan Uni	www.ltu.mmu.ac.uk	Great Britain	University
CREATE	Create.suffolk.ac.uk	Great Britain	University College
Uni of Ulster	www.ulster.ac.uk	Northern Ireland	University
Oaklands College	www.oaklands.ac.uk	Great Britain	Further Education Coll
North Eastern Institute of F and H Ed	www.nei.ac.uk	Northern Ireland	College of Further & Higher Education
City College Manchester	www.ccm.ac.uk	Great Britain	Further Education Coll
Reading Coll of Arts & Design	www.reading-college.ac.uk	Great Britain	Further Education Coll
University of Galway	www.openlearningcentre.com	Ireland	University
Dun Laoghaire Inst of Art, Design and Tech	www.iadt-dl.ie	Ireland	Institute of Technology
Upper Bann Inst	www.ubi.ac.uk	Northern Ireland	F and HE Coll
Belfast Institute of F & H Ed	www.bbelfastinstitute.ac.uk	Northern Ireland	Further & Higher Education Coll
Unique Learning	www.uniquelearning.com	Ireland	Company
Tameside College	www.tameside.ac.uk	Great Britain	Further Education Coll

Table 2. List of institutions in study

An immediate conclusion from the study is that the countries of North Western Europe are the English-speaking regions of Europe. In the use of LMSs for e-Learning there is an immediate dependence on the major American LMSs, especially WebCT and Blackboard, who are the market leaders.

In the last few years there has been extensive promotion of WebCT, and to a lesser extent Blackboard, to Irish and British colleges and universities. WebCT has embarked on a concerted sales drive to convince the British and Irish higher education sector to adopt WebCT.
This confident approach of WebCT to the British and Irish higher education market is mirrored by press releases from March 2002 about the economic success of WebCT in the depressed Information Technology market of this period:

WebCT , the world's leading provider of integrated e-learning systems for higher education, has announced record financial results for the year ending December

31, 2001. The highlight for the privately held WebCT was a substantial increase in total revenue: 2001 total revenue increased 292 percent year-over-year.

The Company also announced triple-digit year-over-year increases in every significant revenue category, including license revenue, which rose 334%; publisher content revenue, up 869%; and sales and support revenue, which increased 158%. WebCT's record 2001 financial results underscore its continued dominance of the higher education e-learning category.

Two decisive factors contributed to WebCT's explosive revenue growth in 2001. First, the company continued to add new higher education customers at a record pace, winning an extraordinary 72 percent of all competitive new business evaluations in the past year. As a result the Company grew its customer base by more than 40%, adding more than 750 new institutions to its global customer network. WebCT, which already had the world's largest installed customer base in higher education, now has a course management system network of more than 2500 institutions in 81 countries around the world.

Internationally, WebCT's 2001 customer acquisition was particularly strong: the company signed on over 500 new international customers in 2001 alone. This growth was fueled by the company's continued expansion of the localization program of its platforms in 10 major world languages, and the increase of its global re-seller network.

At the same time that WebCT grew its customer base in 2001, the company also successfully expanded existing customer relationships, thanks in large part to the successful rollout of WebCT Campus Edition. In the first nine months of its availability, WebCT has over 180 campuses that have purchased its Campus Edition software product. The majority of these sales came from existing customer upgrades, reflecting the strong commitment WebCT's customers have made to supporting their institutional goals of improving academic performance and access through their campus' course management system.

"Our significant revenue and customer growth in 2001 demonstrates the power of WebCT's business model, which is focused exclusively on e-learning," said Carol A.Vallone, president and chief executive officer of WebCT. "Building on the momentum of last year, we are excited to continue to lead the higher education e - learning industry, as we prepare to deliver a truly breakthrough product that will enable institutions to achieve their goals, and take e-learning to a whole new level."

Table 3 presents data on the use of LMSs by the institutions interviewed:

Name of institution	LMS	Other LMSs used	# online courses	# online tutors	# online students	# years in use	Typical course length
DEIS, Cork IT	Top Class 3.1.1 and 5.0	Proto, Blackboard	10	3 fulltime, others	400-500	Since 1995	100 hours
FAS	TopClass	Skills Vantage	-	2	2100	4	6 months
Dublin IT	WebCT	TopClass, Intranets	12	-	100	2	varies
Sligo IT	WebCT	Blackboard	2	3	60	0.5	3 months
Cork IT	TopClass	Moving to WebCT	-	-	-	Since 1995	-
Manchester Metro Univ	WebCT	In house	150	190	7000	4	2-120 hours
CREATE	WebCT	Solstra Hybrid	13	9	800	18 months	5-30 hours
University of Ulster	WebCt	TopClass, Blackboard, First Class	150	400+	24.000	2	semester
North East Inst of F & HE	Ascot Systems Coursemaster	Net tutor	-	-	-	-	-
Upper Bann Institute	IT Campus	Plato, Destinations	50	120	4000	1	34 weeks
Belfast Inst	Blackboard	None	139	-	1000+	2	various
U of Galway	Intranets	None	1	4	22	1	2 years
Dun Laoghaire IADT	Blackboard	WebCT	6	4	140	4	3 years
Unique Learn	VISIT	Learn2	1200	-	-	1	6 months/1 ye
Oaklands College	Granada Learnwise	TekniCAL Virtual Campus	-	3	-	1	various
City College Manchester	Blackboard	none	20	100+	1000s	1	variable
Reading College	FDL Learning Environment	none	4	6	60	7 months	-
Tameside College	WebCt	none	50	400	17.000	1.5	1-50 hours

Table 3. Data on use of LMSs by institutions

The types of institutions in the study were:

Universities	4
Institutes of Technology	5
Collegess of higher and further education	7
Government training agency	1
Training organisation	1

Course creation

Distance education systems are usually held to have two complementary subsystems: course creation and student support services. These two subsystems are both necessary to distinguish distance systems from Teach Yourself Books and to justify the award of university degrees, college diplomas and training certification for courses studied at a distance. In electronic learning (e-Learning) these two subsystems reappear.

WebCT was ranked from 'excellent' to 'very good' by those who used it. TopClass was cited as having a medium level of difficulty for use and 'not so good' by another.

Typical comments were:

We have found WebCT to be a pedagogically neutral tool, i.e. it does not impose a particular learning style on staff / students. We have examples of didactic and constructivist courses along with communication rich learning communities.

The current WebCT designer interface does require some staff development training. However, this tends to be done along with the necessary instructional design training.

The instructor interface is intuitive for new users to use with minimal training.

WebCT provides a media library facility and a means of integrating CDRom based content. WebCT provides self test, quiz and assignment tools. The quiz tool comes with comprehensive reporting facility.

And again: The WebCT structure provides a framework which does not impose a particular pedagogy. The system requires a certain level of IT skill, mainly to do with file management and windows-type operations. I reckon initial training takes about two days. *It is fully multi-media compatible.*

Blackboard was judged as being excellent, fast and simple for course creation. It was considered extremely easy for use by teachers and course developers.

Blackboard was considered to allow complete didactic flexibility for users. It was considered very user friendly. Tutors like the interface and the ease of use. It does not require high technical prowess.

Top Class was ranked as: *Medium level difficulty for course creation. At times it is counter intuitive, even when one uses the Top Class Publisher tool,*

and

Top Class provides a publishing suite. Using a product called TopClass Assistant you can convert a Word or (less successfully) a PowerPoint file into a plug file which can then be uploaded to the server. From Word or PowerPoint you can also create a TopClass Publisher file which allows for easy-editing of structure and content before you again publish as a plug file and upload. Publisher can also be used to create courses from scratch. You can also write individual pages in HTML live. Publisher doesn't work as it is meant to: All kinds of problems occur in the conversion of Word to Plug, or Word to Publisher or (less frequently) Publisher to Plug files.

The didactic flexibility of WebCT was acknowledged, but TopClass was considered too structured and templated. The reason for this was analysed as the concept of a course in the TopClass system:

A major factor is the way it understands what a course is. It forces you to regard a course as a series of folders and quizzes and bundles them together as a course. It is sufficiently open-ended to allow you to use discussion forums, case conferencing, web weaving to expand this in-build notion of a course. It provides these and you can try to make them work towards creating more innovative interactive courses.

On the question of teacher userfriendliness WebCT was considered very userfriendly and easy to use. Top Class demanded 'a long learning curve', calculated at several months:

It was my intention to learn it on my own but it was a long learning curve - it took several months.

Support for graphics and moving image was considered satisfactory in WebCT. TopClass was also acceptable except for the creation of batches of mathematical equations.

Questioning and assessment provision was acceptable in WebCT which was considered to provide a 'variety of options'. TopClass was criticised for providing only quizzes and these were not considered relevant for university teaching:

There is plenty of multiple choice/Boolean/true or false questioning techniques but these are not suitable for our mathematics students. The multiple choice could be autocorrected but this is not usable for in depth questioning.

And again:

There is a separate authoring package for creating tests. It provides 5 or 6 different versions of quizzes and multiple choice questions: list matching, Boolean, upload text. Quizzes can also be created directly using an online development tool and some HTML. Assessment seems to be seen as consisting of

just quizzes. I personally use quizzes only as comprehension tests to make the user pause as they click through the material. These are not really assessment tools.

Granada Leaarnwise is produced by Granada Learning in the United Kingdom and has been selected to form the core of the National Learning
Network CAT (Content Access Tool) for FE Colleges in the UK. This tool will provide hosting for commissioned materials and will allow all UK Colleges to get hands on experience of the content in a Virtual Learning Environment to help in their appreciation of and planning for the move to e-learning.

LearnWise is a Server system that enables the delivery of Web based e-learning content together with collaboration tools, testing and assessment and tracking and reporting. The product is designed for the UK Higher and Further Education markets and is currently in use in over 30 FE Colleges.

LearnWise uses the IMS Specifications for Content Packaging and Enterprise Interfaces.

Granada Learnwise is described as being very easy to use for course creation, to be well structured and to be IMS/SCORM compliant. It is described as excellent for student questioning and because it is standards based it can cope with content from other suppliers.

Ascot Systems Course Master and NetTutor is a United Kingdom system that allows trainers to rent virtual training facilities for some GB£8.30 per student day and deliver training directly to the desktop anywhere in the world.

Ascot Systems has opened a new Virtual Training Centre offering virtual live training rooms – the equivalent of the serviced classroom. Clients can rent and operate multiple classrooms simultaneously. Classrooms can operate in tandem or in isolation from each other.

Clients can access their material from Ascot Systems' server, delivering to anyone, anywhere in the world, if necessary utilising existing traditional learning resources. The Ascot Systems product was considered excellent for course creation and after initial training worked well for course developers.

ITCampus is compatible with generic software packages (especially
Microsoft products) and the transferring of course materials/handouts e.g. Word documents, html files etc., which were already available in electronic form, was straightforward. The other aspects of the course e.g. announcements, user instructions, discussion boards, tests, had to be re-typed into the new platform.

The original materials were opened in their native programmes, (mostly Microsoft Office 2000) and then saved as html versions into the original folders. Both material versions were uploaded to ITCampus and the performance of each was assessed. In all cases the html versions loaded and ran faster than their native versions. The videos for this unit were uploaded and checked for loading and running times. The ability of ITCampus to stream video from the server gave faster loading times with no dropped frames or stoppages

due to buffer underruns. The ease of including or attaching audio notes to all materials could be beneficial to students with visual impairments.

VISIT is described as a Course Management System developed by Eurosync. The use of this LMS for course content was described thus:

Our courses are developed on the StreamMaker platform and uploaded to our media servers. They can then be accessed through the LMS – the courses themselves are not built through the LMS. We have found the interface easy to use and intuitive from both a teacher and developer perspective. All our courses are fully interactive, multimedia-orientated. This is fully supported by our LMS. Questions (both pre and post test) are included as part of the courseware. The results of all exams and assignments are reflected in the LMS.

Student support services

Student Support Services is that half of a distance education system which comprises all the activities of the course from enrolment to examination apart from the course learning materials. The provision of satisfactory student support services was one of the distinguishing facets of distance systems which distinguished them from Teach Yourself Packages and justified the awarding of nationally and internationally recognised qualifications for study at a distance.

WebCT is stated to offer 'plenty of opportunities' for student interaction, but this depends on course design. TopClass is said to offer 'quite comprehensive' possibilities.

WebCT, is said to offer both synchronous and asynchronous communication, but TopClass only asynchronous in the version used.

WebCT is said to provide the following student support tools: *Quizzes, communication tools, external links, a take notes feature and a search tool allow students to interact with the course in a number of ways. Calendar, mail, discussions and chat (whiteboard) tools can be used to promote student interaction. All communication tools can be targeted to individuals and/or classes and facilitate communication between staff and students and among student groups. A curriculum tool can be used to embed reading lists. Also dedicated links to external reading lists (held at department or library level) can be included on the main course menu. General text box or attachment feedback can be provided. The release of scores and feedback is controlled by the course instructor.*

Another respondent describes the student support tools of WebCT thus:

1 SHARED PRESENTATIONS; STUDENT HOMEPAGES; WHITEBOARD. E-MAIL; DISCUSSIONS; CHAT: SYNCHRONOUS AND ASYNCHRONOUS. ALL THESE COMMUNICATIONS WORK AT COURSE LEVEL AND INVOLVE COMMUNICATION WITH THE TUTOR AS PART OF THEIR MANAGEMENT. YOU CAN SET UP BIBLIOGRAPHIES/REFERENCES ETC IN THE COURSE. YOU CAN ALSO HYPERLINK TO ELECTRONIC RESOURCES AND LIBRARY RESOURCES. THERE IS A GLOSSARY FUNCTION. THE SYSTEM ALLOWS MARK AND TEXTUAL FEEDBACK THROUGH TESTING AND ASSIGNMENTS FUNCTIONS BUT ALSO ALLOWS RELEASE OF ANY

STUDENT MARKS/TEXTUAL ASSESSMENTS KEPT IN 'GRADEBOOK' FUNCTION. STUDENTS CAN SEE ALL RELEASED FEEDBACK, AND ALSO STATISTICS ON THEIR PERFORMANCE IN RELATION TO OTHERS.

The WebCT tools are available 24 hours a day but the system is manned only during working hours. TopClass is described as 'perfectly adequate' and is described thus:

One to one communication through messages in an email system which can be tracked is the provision. Plus discussion forums. How you use it pedagogically is the challenge but it is a good facility. A whiteboard might be a nice addition.

WebCT provides a special tool for resources and one can insert links in WebCT, and TopClass.

In WebCT assignment feedback depends on the tutors and their comments are easily accessed. In TopClass autocorrection gives results to the students immediately but with this proviso:

The basis is the one to one asynchronous facilities - the server corrects the questions and gives feedback and then triggers additional features. If you want to work with it you could provide context sensitive feedback but it would take months of time to set it up.

Blackboard's student support tools are listed as quizzes, digital drop-box and whiteboard. They are described as very good with chatroom and discussion board. Both synchronous and asynchronous communication are supported. It is up to the individual tutor to create links to a library. Feedback on work and assignments is described as excellent, particularly usage statistics.

Granada Learnwise is said to support peer to peer and peer to tutor communication in both synchronous and asynchronous modes.

Intranets student support tools are described as:

Online forums for each module, plus general chat forums, plus forums for dealing specifically with administrative and policy issues. Students have read/write access. Threaded text discussion. Learners use it regularly. They also have email addresses for other students for offline contact, and this also happens. We only use asynchronous communication, though the VLE would support synchronous chat. There has been no demand for this. Students can email tutors and administrators or post questions to online forums. These are responded to during office hours. Many readings are posted on the system. To get books on loan from the library, they directly connect to the university library, which will mail out books to them. There is no direct link between the VLE and the university library.

VISIT by Eurosync has these features:

We have a tool called Web4M which provides synchronous communication. Web-4M is a comprehensive collaboration and learning environment. It is an integrated suite of peer-to-peer, multi-user and groupware tools that delivers information "Just-In-Time". One

of the major advantages of Web4M, in any communications or e-Learning environment, is the synchronous environment that it provides. Student to student is supported. Web4M™ extends the chat room concept to provide users with a full suite of multimedia tools. In each room, users can use audio conference, chat, share graphics via a white-board and view slides through an interactive slide show. Web4M can be used as a virtual classroom whereby a 'teacher' can present slideshows, PowerPoint presentations, or any other multimedia format that can be presented over the WWW. Multiple 'students' who have logged into this active session can then view this multimedia presentation in real time—and participate in a true synchronous environment. It is also possible for the 'students' to see their 'teacher'. This is achieved using video where a live video feed is transmitted to the 'students' from a 'teacher's' machine. This can be accessed 24 hours a day. Feedback on work and assignments is up to the assigned tutor. Technically, this is easy and is again achieved by using our synchronous/asynchronous tool, Web4M.

Tutor support tools

Another feature of the student support systems in distance learning, which distinguished distance systems from Teach-Yourself Books and justified the awarding of university degrees and other certification for courses done at a distance, was the provision of tutor support. Thus in e-Learning systems the provision of tutor support tools is an important dimension which distinguishes e-Learning courses from self study packages.

In this section we present the evaluation of tutor support tools given by the respondents on the LMSs they had purchased or developed.

WebCT is variously described as 'good', 'perfectly usable' and 'students can be tracked easily':

Students can be tracked easily by groups or course, but not individually across all courses. Tutor can view areas visited and tools used.

WebCT's provision of tutor support tools is further described:

Full tracking of student activity and performance is available from a simple MANAGE STUDENTS menu. Group discussions and assignments can be facilitated using the student presentations tool. WebCT 3.x campus edition quiz authoring tool is not the most easy to use. However, the Respondus tool (which integrates with WebCT) is very easy to use in this respect. Student progress etc. is a function of the manage students tool. We have fully integrated WebCT with the course student and staff databases using the IMS enterprise API tool.

And again:

In WebCT we can export mid and end-year grades to MIS. There is the usual array of communications tools, plus gradebook for progress, plus tracking of every student visit to course pages. For the preparation of questions and assignments much depends on the tutor's IT skills: many start with Word and move on to more multi-media and interactive methods, but it takes time.

Tutor support tools are said to be a good feature of TopClass:

This is a good feature. The data is easily accessible and you can collect different sets of information according to your need. The facilities are good and you can create classes or courses and easily modify them.

It is a good system once you have figured out how it works. For the list of students you get: mail/look student's profile/coursework/review of submissions they have sent in/test progress/you can look at what pages they looked at/ when they did so/how much they looked at/ what % of material each student looked at/what % each student has clicked on to/which actual pages each student has clicked on. A brilliant facility.

Groups can be allocated in WebCT. The TopClass facilities are described as 'good' and described as:

There is a create/edit class facility. On day 1 you associate students and instructors for each course. There is batch registration of students: you can automatically register 200 students in 1 minute providing their full names in a pre-ordained format, the server then, according to set guidelines, produces usernames and passwords. A very useful facility

On the question of the preparation of questions and assignments by tutors WebCT is described as 'the LMS is fine but tutors need training', 'given training the system for design of quizzes/tests is simple' and 'moderately successful'. TopClass has an authoring package for creating multiple choice questions but developing questions is time consuming. It is described:

Limited facility. Creating question pools is lengthy and awkward. This is added to the limited nature of the question types in the system.

Monitoring and planning by tutors for student progression in WebCT:

Tutors can see which pages have been viewed by which students, how many discussion messages students have read, how often students have logged on

In TopClass there is a flexible monitoring system:

There are already a large number of monitoring tools for what students studied and submitted. You can get the average mark of the class on assessments. Class progress can be easily studied. You can assign a time frame to parts of the course or the whole course. You can make Part 2 available only when successfully passed Part 1.

There is said to be no provision for tutor to institution communication in WebCT. TopClass 5 is said to have an excellent system:

In general tutors have too few tools and administrators have too many. Changing the defaults is tricky. Top Class 5 has a campus wide administration system which works with an Oracle database. You need a specialist for Oracle.

Tutor support tools in Blackboard are said to be easy to use, group management is available, there are facilities for the construction of simple questions (multiple

choice) and online marking of tests (quizzes). Another respondent stated that the tracking of students was easy and efficient and that there were excellent facilities for group management and preparation of questions. A further respondent stated that the tutor support tools were very userfriendly as was the preparation of questions. For monitoring student progress there was the grade book, course statistics and the number of specific hits.

For Granada Learnwise the present version 1.2 is said to have good reporting facilities which will be improved in version 2. The linking of the LMS to other institution recording systems is given thus:

As this is an interoperable product (IMS and SCORM compliant) interoperability between the VLE (LMS) and Student Record Systems (SRS) is 'relatively' easy for all commonly used systems in the sector. Between Capita systems and the VLE these are highly developed for interactive communication.

For FDL Learning Environment 2.09 it is said that the student management system is relatively straight forward, and reports can be generated from the student database but there is no link at present between the LMS and the MIS.

VISIT by Eurosync lists the facilities that are provided by the LMS to the tutors for managing their group(s) of students as: *Adding, editing and uploading course material; maintenance of reading list for both online and offline content; correction of tests or test sections which cannot be corrected automatically by the system. scheduling of classes. The system provides tutors with access to the following administrative tools for monitoring and planning student progress: responding to particular questions on forums and moderation of forums; online mentoring; LMS provides up to date statistics on all aspects of student progress. It is possible to drill down to course level and generate reports on individual students or groups of students.*

Administrative systems

This section deals with the provision by the LMS for student enrolment and collection of fees; for the provision of passwords and system security; for the provision of a student records database; for the collection of student data for course results; and for the provision of administration for courses, classes and tutors.

Paulsen(2002) has recently shown that LMS administrative systems contain various subsections: course creation tools, learning management systems, student management systems and accountancy and has argued that ideally all these systems should be integrated together. He has proposed a Jig-saw model of online administrative systems and a Hub model. He writes as follows:

The Jigsaw model is a simplistic model used in the web-edu project. It includes the four main categories of online education systems that are listed below and presented in Figure 1.

- *Content Creation Tools (CCT)*
- *Learning Management System (LMS)*

- *Student Management System (SMS)*
- *Accounting System (AS)*

It is called the Jigsaw model to indicate that these systems should fit together to exchange data more or less seamlessly. The figure also presents some examples of actual systems and shows how the IMS specifications relate to the systems.

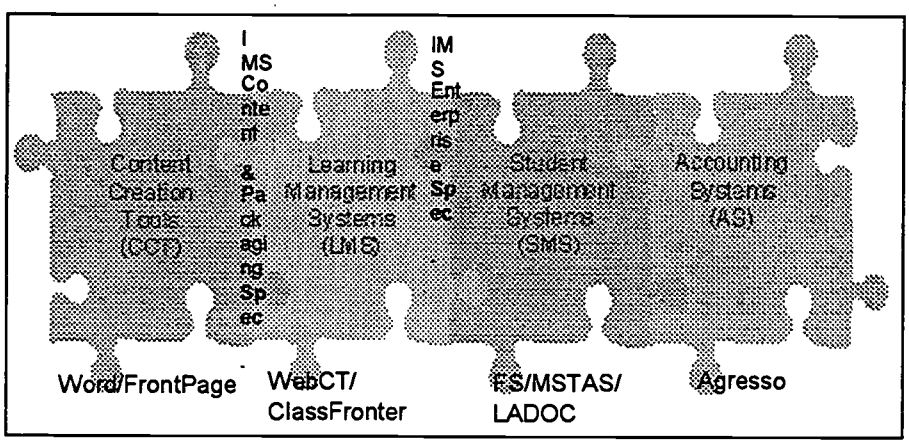

Figure 1. The Jigsaw model for online education systems (Paulsen)

The question on enrolment and fee registration systems was not clearly answered or perhaps misunderstood. WebCT is variously described as having 'no enrolment system', 'none in this version', 'not aware of system' and yet 'enrolment system is interoperable with our main system'. Again it is stated that enrolment is done by the university registry using the existing student record system.

TopClass comes out well here:

There are two enrolment systems: the Batch System which assigns passwords to students as they enrol and the Apply to Enrol and be enrolled System, both of which work well.

Most of the other systems do not have online registration, but VISIT by Eurosync's LMS 'uses a checkout system, EasyClear. New students would fill out a registration form, get a username and password and they would then be able to buy courses online.'

On security WebCT is described as 'as good as any http system', 'username and password for access', 'satisfactory' and 'very good'. TopClass too applies user name and password access and is considered fairly watertight, on condition, one respondent adds, that students do not give out their passwords.

No problems with data security were reported by any of the respondents, with Blackboard being described as 'good' or 'no problems'.

VISIT by Eurosync has various levels of security and password control:

Public users have access to the site and all elements not protected by the user management and security.

Registering Students are required to have a login account to access the element of the site based on their permissions. For example access to interactive courses and tests. They will have access to their test results and their progress on their selected courses.
Access to schedule showing online classes, registering for classes.
Each student has access to information showing their progress on various aspects of their course. This would cover for example their exam results, progress on their projects and viewing their reading list.

Student record database in WebCT is variously described as 'limited by flat format but will move to Oracle in 2002', 'adequate', 'seems fine' and 'very successful and stable and easy to manipulate'. Some integration of systems is indicated by:

We can link it to our IMS and download data. The API is advanced in the VLE world and conforms to IMS. Data is stored at course level: i.e. I can easily get data into courses and the global database; it is not as easy to get information from courses, though you can export into global spreadsheets.

The student record database is described as 'one of the great strengths of the TopClass system'.

VISIT by Eurosync uses an active/passive SQL cluster on a Windows 2000 platform which is both efficient and fast.

The question 'What structures are provided for recording data for certification?' brought for WebCT the answers 'none at the moment', 'grades are recorded' and 'will be integrated to our central system', 'we would not do this. We use our MIS as the single data source. Most Examining Boards will not accept electronic source evidence'.

In TopClass:

All the discussion forum is archived. To check class grades you go into the student area. When did they do the tests? How many times did they sit the tests? This is a pretty good feature. Subject always to the quiz mentality of the system.

'What facilities are provided for administration of courses, classes and tutors?' brought the answer for WebCT that there is a global database and individual course databases and that it can manage courses, students and files.

TopClass has an extremely flexible system which is described as 'fairly simple to use and good for assigning tutors to groups':

Extremely flexible system: perhaps there are too many choices with different privileges at different levels. One problem worth mentioning is that to find an individual user you have to search all users rather than have a search facility for individual classes. Also: Course material is not the same as class material: which can be confusing.

VISIT by Eurosync reports:

The facilities provided for the administration: secure access for appointed staff that have access to control all aspects of the web system. The main sections are:

- *Teacher / Tutor administration; Adding, removing Teachers from the system, Setting permissions for Tutors*
- *Student administration, Adding removing Tutors from the system*
- *General Site Management, Adding, editing sections*
- *Content Management, Approval of content added by tutors*
- *Forum Administration, Full control over all forums, setting topics and access for all users, Responding to feedback from all lower lever users*

Another level covers the features of the system tutors will have access to: Adding, editing and uploading course material, Maintenance of reading list for both online and offline content, Correction of tests or test sections which cannot be corrected automatically by the system. Scheduling of classes, Responding to particular questions on forums and moderation of forums.

Technology

Technology has been used widely in educational systems since the 1930s when Plessey and then Skinner set out to design 'the perfect teaching machine'. A major distinction between face-to-face and distance education systems is that in face-to-face education the technology is a supplement to the teacher, while in distance education it is a substitute for the teacher. In electronic education or e-Learning the role of the technology becomes crucial for the operation and success of the system.

WebCT is described as:

> ***The software has been robust and is subject to continual development and improvement. Servers depend on the institution (locally installed rather than hosted). WebCT lives on the server: only client issues are browser settings, which often need altering from normal defaults. To my knowledge there is no metatagging, though the next versions of WebCT allow resource sharing of learning objects at supra course level, so I think the repository and metatagging is to come. As WebCT is a leading member of IMS, they are absolutely committed to this development. The Vista range (next generation) is aimed at interoperability and allowing third-party software to interface. We are not large enough to stretch it. I believe large user databases have 60,000 students. There is the facility for load balancing across servers and multi-institutional use. Speed is OK on our network, but this has been upgraded. We have not used a lot of multimedia materials, so cannot say. We tend to advise tutors to keep file-sizes small and think of 56k modems.***

WebCT runs on a range of hardware and software platforms and was described as 'acceptable and well integrated'; one institution used it as a standalone system running with an Apache server.

For TopClass:

All you need is an NT server or a Windows 2000 server and students don't need any software - a big advantage. It runs on UNIX and Mac as well.

WebCT runs with all browsers though bandwidth is said to be a problem. The current version does not permit metatagging but the next version will. TopClass is described as:

Every page of Top Class is in HTML. It can be used with any browser. The .plug file format will only work with Top Class. It is very good at tracking pages or courses or tagging to help you to find pages: useful when pages get dislocated.

The Intranets website is hosted by Intranets in the US. 'As our system is all text-based we have not had serious difficulty as regards access times. The site is not integrated with our office systems'.

WebCT is described as 'perfectly flexible and frequently updated'. It is described:

Flexible but also limited by the designers level of creativity and their pedagogical expertise. It is possible to integrate other software within the software structure and we went with an internationally recognised, well established software provider to make sure there would be regular upgrades of the technology. They were particularly supportive of academic's needs as a lot of their work is to support this market.

Top Class is 'relatively flexible but requires a knowledge of how HTML handles graphics' and:
The didactic structure is not really flexible but you can use it cleverly. It could be worse. Because the pages are web-based one can integrate it with other software or systems. 'Click here' to launch NetMeeting is a possibility. One could stick in a chat system. Top Class 5 is said to work brilliantly with new systems.

One institution states it has created over 7.000 courses on WebCT and enrolled aver 24.000 students and the system coped without a problem.

Another institution had no trouble with 8.000 students on Web CT and it was described as very good for large numbers of students, courses, tutors. There were no difficulties with TopClass 3 but differences between TopClass 3 and 5:

There are differences between Version 3 and Version 5. Top Class 3 you bought on the number of enrolments at the one time. Top Class 5 you buy by the number of registered students in the system. Oracle lets Top Class 5 use a minimum of 1000 students. The basic Top Class 3 licence was for 30 simultaneous users. We have had up to 1000 students on it without a problem.

Blackboard Level 1 is said to accept up to 10.000 enrolments; Blackboard Learning System more than 10.000.

Granada Learnwise accepts metatagging.

WebCT was described as being limited only by client bandwidth with one user stating they decided to use only low bandwidth content because of end user issues. TopClass was running on a normal desktop not a specialised server.

VISIT by Eurosync is analysed as:

The courses will run on Internet Explorer 4 and above on any pentium machine. StreamMaker allows you to stream the courses on nothing more than a 28.8k modem with only a small amount of latency. The system does permit metatagging. The didactic structure is flexible and is determined by the developers who design the course rather than being determined by the underlying technology. The technology can be upgraded if new updates become available. The capacity of the LMS is dependent on the capacity of the web server farm that hosts the site, database etc if the course is being done online. Almost all our courses are intended for online use. In theory it could handle thousands of concurrent online users as long as there was enough capacity on the web servers. StreamMaker™ is the basis for all of UniqueLearning.com's streaming elearning solutions. StreamMaker™ uniquely enables the creation of full screen, fully synchronised interactive multimedia, delivering graphics, animation, text and audio over the Internet and corporate Intranets.

Price

Investment in an eLMS for e-Learning is not a cheap decision. In recent years there have been considerable price increases for the purchase of and use of LMSs. There have been claims that some producers have abandoned the academic market of colleges and universities in favour of the corporate market. These price changes have led some institutions to change suppliers, or even to consider the possibility of developing their own LMS.

The price of WebCT is given as $5.000 per year but this is qualified by another respondent who states that an unlimited standard edition licence is now in 2002 $7.000, up from $5.000 last year. A further respondent quotes $12 per user and another says that the institution negotiated the price. Another system manager left these questions blank which may indicate that the price was not known to the system manager.

The full cost of WebCT for a year is given as:

2 THIS YEAR'S UNLIMITED USER LICENSE FOR WEBCT CAMPUS IS $29.500. MAINTENANCE COSTS ARE DIFFICULT TO SAY. I WORK FAIRLY FULL-TIME ON IT, BUT TRAIN, ADMINISTER AND SUPPORT AS PART OF THIS, AS WELL AS DEVELOPING SOME MATERIALS. WE DEVOLVE E-LEARNING WITHIN THE SYSTEM TO TUTORS WITHIN OUR SCHOOLS. MUCH OF THIS TRAINING OF TEACHERS AND LEARNERS AND SYSTEM USERS IS ABSORBED, BUT WE ALLOW THE EQUIVALENT OF□ 20.000(€31.250) PA.

Blackboard Level 1 is given as £4.500 (€7.031) pa and Blackboard Learning System as £22.000 (€34.375) pa. In addition maintenance costs are said to be massive: a Blackboard administrator, Blackboard trainers, IT technician support;

generation of content costs more than the LMS. Another Blackboard respondent, however, gives costs as $295 per course per annum.

The cost of Granada Learnwise is not known. However, the respondent remarks:

The cost to the institution is much bigger than the cost of buying the vle(LMS). Huge development costs are required to get the culture change necessary to take on such technology. This is not unique to this system it is true for all. Maintenance costs: VLE Administrator (Online Systems Engineer) is the only one dedicated to the VLE itself. However a specialist content team and mentoring team are required as well as management. Training of teachers and learners and system users costs are enormous.

The price of TopClass is described dramatically as:

Top Class 3 was £1.735 including VAT, but this may have been an institutional price, for 30 simultaneous users per year - this means that 30 could log on simultaneously. Top Class 5 allows a minimum of 1000 users at £18 per head per year for a total of £18.000 per year for a 3 year contract. Then you have maintenance fees plus an Oracle database plus staffing. We consider that Top Class have turned their backs on the higher education market and have decided to change to WebCT.

Another respondent states that the cost of updating is prohibitive so 'we have decided to design our own LMS'.

The WebCT staffing is given as one academic per year and half a technician; administration and help desk support; none - hosted by supplier; need financial support for staff training and purchase of servers.

One institution had a team of 8 catering for 2.100 students online on TopClass, another stated:

There are two answers to this. There was no problem with Top Class 3. Until recently no problems since installation by an IT specialist which took half day. Top Class 5 is horrendous. It took one full day for a person from WBT Systems plus 2 Oracle specialists and there have been many problems since.

The costs of Ascot Learning System Course Master is put at £40.000 (€62.500) per year plus one IT technician and 100 hours of staff training time.

The FDL Learning Environment 2.09 is currently free as it is a pilot institution but it is said that training materials are poor and the college has to provide technical and pedagogic training materials.

Intranets costs $150 per month with no maintenance or training costs.

The costs of IT Campus are not known but the college allows £15.000 (€23.437) per year for maintenance.

VISIT by Eurosync costs €40.000 to buy with an annual fee of €20.000. Maintenance is the responsibility of the IT manager and training of the teachers and learners is not a concern.

On the training of teachers and learners and system users there was a range of responses: for WebCT - 35 to 40 days of online training per year; reseller to train staff at £500 per day; 18 hours per lecturer; provided centrally from departmental funds. For TopClass the institution had to develop courses for both staff and students.

Evaluations

Respondents were also asked to give their overall assessment of their satisfaction with the LMS they had purchased or developed and what features they would like to see included in the LMS in the future. Although these questions were additional to the questionnaire, most respondents took the opportunity to add further comments.

Of the WebCT users who replied to this question one stated 'very good and userfriendly' the other 'ideally suited, efficient and adaptable'. Another states 'We have found WebCT to be an excellent tool for implementing e-learning across the institution'. Yet another 'Excellent for us, although we recognise it is not perfect'.

On Blackboard 'Satisfied - we plan to upgrade from Blackboard Level 1 to Blackboard Learning System'. Again 'Blackboard was very simple and easy to use - would recommend it'.

The view on Intranets gives a different perspective:

Generally, this system meets our needs. It is simple, unfussy, and easy to learn. In the long run, we would like something more sophisticated, but we found when we were looking for a system that providers wanted to give us greater functionality than we required and they wanted us to be champions within the university for fully integrated campus systems, rather than provide something that would allow us to get on with our job.

There is a touch of sadness in some of the evaluations of TopClass:

I have looked at Blackboard and WebCT. I would sum up the Top Class experience as initial excitement leading to eventual dissillusionment. We wanted to support it because it was Irish and had been developed in Ireland and was an Irish world leader. But our contacts with the company were less than helpful. They are, unfortunately, more interested in corporate clients. We are going to move to WebCT.

And again:

We were quite satisfied with Top Class 3. It was a bit non-intuitive for developers and there are bugs in the authoring system. It was short sighted of Top Class to move from the higher education market. The Top Class authoring system would have been good if it worked as it was supposed to. We have decided to move to

WebCT as TopClass have left behind the HE user in favour of corporate clients. Top Class 5 is also too pricey and runs on Oracle which requires a very specialised expertise to configure and maintain. There are few HE institutes still using Top Class today. WebCT bills itself as the world's "leading provider of e-Learning solutions for higher education" so hopefully they won't abandon their HE clients - Blackboard then seems to be more for K-12.

VISIT by Eurosync gets this judgment:

Our emphasis is on creating and providing courseware to corporate and individual clients. We are not LMS specialists but do consider a solid and adpatable LMS as a key consideration in our corporate strategy. We find that our current LMS suits all our needs at this point in time. The previous LMS we used was inherited from Learn2 but we felt it didn't suit all our needs.

A further user states 'we are not satisfied with what is on the market and will develop our own'.

Finally respondents were asked what changes they would like to see in the future to the LMS they had purchased.

The WebCT users said 'compliance with LMS standards' and 'global tracking of students, cross course emailing and IMS/IEEE standards'. Also 'Improvement of question and testing formats'.

On Blackboard the request is for 'Integration with other systems - student records, examinations, photos, more security, faster speeds'. And also 'Integration of enrolments etc'.

FDL Learning Environment is asked for 'Continued support for Macintoshes and ability to successfully import and export IMS content packages'. On Intranets 'We would like some form of student tracking integrated with the system'. On IT Campus 'Full enrolment and student record system'.

For TopClass:

In the Top Class system I would like to see a much shorter run up time for the tutors: something simpler - an easier path from beginners to improvers to advanced. Many of my colleagues were put off in the beginning. They were blocked from having their notes in Word to putting them into the Top Class system

and

Top Class would be nice if it was not so templated. It needs some synchronous communication, including desktop conferencing. They will have to offer easy ways to do things like inserting Shockwave and Flash content and streaming audio and video and intelligent whiteboarding. It needs to be graphically more inventive and user-friendly: in displaying courses Top Class needs to go beyond this overly-repetitive system of clicking on a left frame index to view content on the right. At the moment TopClass seems to be predominantly made to bring together simple "text and gif"-type pages which don't take advantage of the unique ability

of the web to host highly rich media content and support all kinds of collaborative activity. TopClass and other LMSs in the near future will need to offer user-friendly authoring packages for teachers and trainers to create simulations and courses with a virtual reality dimension.

For LMSs in general:

In the LMS market in general I would like to see standards implemented more rigorously, for example more compliance to standards such as SCORM and AICC. Big companies such as Macromedia and Microsoft demonstrated tools that will enable easy creation of SCORM-compliant learning objects. It is important to keep up with future developments.

The overview conclusion was one of criticism of TopClass for abandoning the higher and further education market and concentrating on the corporate market. WebCT and Blackboard seemed to give general satisfaction to the higher and further education market. One institution had designed and produced its own LMS, and one was planning to develop its own, and they seemed satisfied with this solution.

Conclusions

The following conclusions can be drawn from this analysis:

1. In the United Kingdom and Ireland there is a very extensive implementation of e-Learning via LMSs. This includes provision at degree and diploma level. It seems that very many universities and colleges have purchased an LMS, and many corporations too.

2. The overall impression is the domination of the scene by the major American-based LMSs, notably WebCT, Blackboard and TopClass. This is because of the use of English in the United Kingdom and Ireland.

3. All institutions are sensitive to SCORM and IMS standards and dissemination of these standards has led to them being considered almost as a norm.

4. WebCT has pushed hard to become the market leader with extensive promotion and presence at e-Learning conferences.

5. There seems to be general satisfaction with WebCT as a user-friendly, competent product.

6. Blackboard has given general satisfaction but is less widely marketed than WebCT.

7. TopClass is praised for its student and records database.

8. Recent price increases, often quite considerable, are a feature of the market with prices in the range €20.000 to €50.000 being quoted.

9. Data produced by the LMS systems are not yet generally integrated into the institutions' administrative databases.

10. The concept of quizzes and multiple choice questioning, a feature of most American LMSs, is not considered adequate for European academic evaluation.

The use of Learning management systems in Germany

by

Helmut Fritsch and Holger Föllmer

Abstract

17 systems have been analyzed during 2001 and 2002 in Germany. This number is not representative for the increasing use of LMS .
Most systems still are under development. The origin of LMSs in Germany coincides with a structural reform of university administrations. The development of LMSs has been pushed forward by faculty members of computer science on the one hand and administrations on the other. Half of the systems interviewed come from universities the other half partly from public further education agencies and private business for inhouse training. Most LMS are self-developed, only a minority has been bought "off the shelves". The scope of the LMSs used is restricted in most cases to didactical elements not covering the administrative and bookkeeping possibilities of professional systems. Even in some cases, where bought systems are used some useful elements are deliberately cut off. Some of the self-developed systems follow the "open-source-policy" thus hoping to interest more users and decreasing cost of universities at large. Almost 70.000 learners are covered by the systems described. The lack of content for the LMSs is deplored in several instances. Meta-tagging and standardization issues do not yet play a prominent role.

Country	Language	Geographical Area (sq.km.)	Population (millions)
Germany	German	248,577 sq km.	82 259 500

A. Introduction

The definition of LMS as presented by Desmond Keegan in this book does not meet the situation of LMSs in Germany. Most systems still are in development.
We found three forms of LMS systems in Germany:

- 1. The all-inclusive-system: Large portions of curriculum material already exist in some digital form and the promise is to offer all necessary elements via Internet, including enrolment, invoicing and administration.
- 2. The second form is course-offer in a section of an institution (and the goal to persuade the rest of the institution to all do it alike), the courses are special and relevant for only parts of the institution (like the "sub-insitution" department for further education)
- 3. The third form seems to be the specialized alternative where only parts of a curriculum are meant to be put into an LMS, parallel to existing other, mostly face-to-face forms.

There are some factors of complication which we found in researching projects which use learning management systems. These factors first have to be isolated in order to come to a set of data which is comparable for interpretation. Lets take as an example the interview with one of the most known systems in Germany with more than half of a university's population to work with it: the LVU system of FernUniversität. Emerging

from three parallel initiatives in three different sections of the university the first steps have been made to integrate the various aspects of a true LMS into one computer based "system". It still runs as a project, the third version will emerge in 2003. There are some courses already functioning totally via the web.

If we take a closer look at this special system we may find that it emerged from academia, faculty members from different fields cooperated and have been merged into one big project. But: Parallel to this effort there is the classical university administration system with a much longer history than the lifetime of this university could tell - so called kameralistic procedures of bookkeeping and administration, not having changed for almost a century run parallel to such "modern" efforts to build a completely integrated system. Indeed as long as the university is state-funded and responsible towards the ministry of education and science, the yardsticks of this organizational structures will be kept in practice. This means that parallel to the project effort of LVU there are other state-wide projects to instal reporting systems, building of indices for efficiency and throughput of products (student qualifications), reforms of bookkeeping and a whole set of separate projects to trace the cost flows and workforce data within a university.
For the last 15 years now the theme of quality management in public services has been a major topic. TQM measures and literature and projects in Europe have influenced thinking of what public services are about. We came across these initiatives in the framework of cummunity politics and the so called Tilburg model - meanwhile there is a global perspective on community reform in that focus more and more is laid on the services aspect and the citizen as a customer than ever before. New public management is one of the outstanding catchwords in this filed. So it is no wonder that also university administrations try to cope with these new demands. It certainly has been kind of a revolutionary act of the former chancellor of our university,(the chief of administration), to fomulate the "goal " of university administration: "to make research and teaching possible".
Influenced by the didactical definition of distance education and calling the institution that offers it "helping agency", a term coined by R. Manfred Delling in the early seventies, this view of the new role of administration : "facilitator" of research and teaching makes it understandable that also university administration today functions according to some principles of new public management. And such an administration will also strive for cost reduction and increase of efficiency. And create models for management decisions instead of just keeping to a set of standardized behaviour. Modern university administrations are not any longer comparable to laboratory rats trained to always behave within a fixed set of conditioned reflexes.

B. Double dichotomy

Whereas we were used to make a structural and analytical difference between the public education sector and proprietary education in Europe (mostly on the level of vocational education), there seems to have emerged a new dichotomy that plays a major role in the development of web education systems. The dichotomy between academia and administration.
If you run a university according to a model of private enterprise you are likely to have an administration that is not inclined to research and develop a complicated system of learning management. The system most likely will already have been developed, tested and sold elsewhere and there will be a "community" of users of such a system becoming a more and more powerful partner for future developments.

Only very large companies will be inclined to have a distrust towards such systems "off the shelves" and only if they have own resources for the development of such rather complicated computer programs. Some of these will develop such systems in the hope of gaining refunds when the system is ready for the "market". These systems will have incorporated all known elements of LMS in order to be able to compete in the market. This is because their administration is not separated from the enterprise but an integral part of the business.
Not so with German universities: There is a tradition that a bright computing center does not need to buy programs developed by others because the need to buy external programs would question the qualification of existing personel in such centers.
Evenmoreso when an academic department for computing science is involved: staff and students would always resent to accept external programs because of the need to prove the everyday quality of own programs as a symbol for the institutions high ranking capacity to be forefront in computer development.
The task of such a computing center indeed will necessarily produce a conflict between the university's administration which hoped for increase of effciciency and decrease of performance cost and the department which always has to look for proofs of their respectability tested in - at least- the "own" market. This seems to be the reason why so many university based LMS's in our study refrained from buying off the shelves. The logical consequence in higher education development with state-funded universities is, that as soon as universities administrations find out that revenue from such LMSs is less than promised they must go for "own" developments to create LMSs or like systems which incorparate the systemic features of such systems also for departments not so inclined to prove their self-confidence by promoting "own" systems. They then will believe in the capacity of larger administration oriented computing systems at least in the dimensions of SMS (Student Management Systems) and AS (Accounting Systems).
That means we always will find the typical dichotomy between academia and administration. Hopefully both sides will in due course learn from each other.

C. The results of the interviews in the web-edu project

The projects interviewed in Germany alone represent som 70.000 learners who already have experience with learning management systems(LMS) of different kinds. This number can **by no means called actual** (the interviews have been carried through in the year 2001 and 2002) **nor representative**.
Yet we do hope to show some trends steming from the projects we encountered, which were on the one hand open for such an interview (we met quite a number of actors in this field who refused to have an interview done, sometimes even with harsh comments) so here is the place *to thank all those members of staff who had been willing to do the interview and thus contributed to this Leonardo project!*

Categories of comparison

Indeed, it is a very big difference to interview an assistant on a part time basis from a chair of a technical university who does a good job in finding a solution for some of the many tasks of teaching, thus helping the professor to concentrate on other things compared with the professional department of human resources of a multinational enterprise using all the features of software they have developed an used for years

now with a fixed cleintele of in house trainees suming up to 20.000 people.
As early as 1997 ZIFF studied the features and compared performances in the field of LMS.
The following remarks have to be read with some precautions in mind:

a) the types of institutions are various - we find universities who decided as a whole to set up an LMS and even consortia of universities.
b) Then we find smaller units from universities who decided to use an LMS and even single chairs to use something like that - self-developed and functioning : we described this as "small but beautiful".
c) On the other side we find companies, who try to get hold of a portion of the expanding market by presenting learning-units and invoicing their clients while they learn.

D. Overview of the German projects interviewed

The following table is already a shortcut version of the data found in the interviews, The size of the data collection made it necessary to use abbreviations and to condense the information. We think however, that this process of *focussing* is a legitimate procedure to come to an overall interpretation. You will find in the following tables always a fixed set of data about the project in the beginning of the table. We have been thinking about constructing a huge database with all the information of all categories included: This would have been too large for any screen or paper- which is the reason for splitting up the answers into the sections of the questionnaire. In doing so we found - again - some items omitted or not paid due attention to them, like the questions of metatagging, accessibility or the "open source policy" of many of the German projects.

List of German projects analysed

Institution Identification		LMS	# students	# courses	# tutors
Virtus, Cologne	University	ILIAS (SD)	12 000	50	30
Teleakademie Furtwangen	Tech. University	Black- board BSCW	500	10	50
Netzentwurf, Karlsruhe	University	SD	100	4	5
Virtuelle FHS Luebeck	Tech. University	Black- board	1000	130	40
LVU Hagen -	University	VU (SD)	27 000	270	100
media-design, München	private	Learnlink evoeye	700	5	130
Osnabrueck Virteller Campus	University	VC Prolog Tutor (SD)	80	3	8
Virtuelle Universität Regensburg	University	planetux (SD)	280	57	35
Darmstadt (SGD)	private	wave learn (SD)	800	2	10
TU Chemnitz, VDE	Techn./ University	(SD)	1000	5	20
akademie.de asp GmbH	private	(SD)	1700	60	none
IPTS Kronshagen	public	interwise- ecp	1000	350	130
SAP AG	private	Learning solution	20000	500	10
Akademie Überlingen	private	lernen -im-netz (SD)	112	24	5
Virtuelle Hochschule Oberrhein ,	University	clix campus	200	6	n.a.
ZWH Düsseldorf	public	DLS from ETS	n.a.	39 systems	>110
BildungPlus eLearning	private	corporate learning	n.a.	25	40

E. Detailed Analysis according to the sections of the questionnaire

Methodology

The following sections, as indicated above, represent the answers to the questionnaire which we agreed upon in the project. We would suggest to keep in mind that the abbreviations used in this table do not necessarily represent the exact wording presented by interviewees but we tried to boil down the meaning of the answers into one or two expressions which in turn try to make the results comparable. This methodology arises with large data but is a new form of research in that after a while it will be common to present a text with hyperlinks back to the original wording. Imagine that there is a huge database with all interviews from all partners and answers to every single question: it easily surmounts the intellectual capacity to present something and even draw conclusions which have to be sound and must be ready to be proved by anyone ready to analyse the whole corpus of interviews himself. This technique can easily be presented in the WWW, where via hyperlink in each cell you travel to the original item.

1.Course development tools

Institution	LMS	studs	courses	tutors	1.1Course creation	1.2 didactics	1.3 Use	1.4 media	1.5 assessment
Virtus, Cologne	SD	12 000	50	30	possible	open	easy	WWW	no
Teleakad.	BlackB.	500	10	50	no	open	easy	WWW	self
Netzentwurf	SD	100	4	5	no	open	1/2 hr.	WWW	yes
Virt FHS	Black-B.	1000	130	40	no	flexible	easy	20 formats	yes
LVU Hagen	(SD)	27 000	270	100	not yet	flexible	easy	not all	automated-
media-design	Learnlink	700	5	130	satisf.	flexible	2 days	all	help
Osnabr.VC	SD	80	3	8	good	exercises	in developm.	JAVA	e-mail
VU Regensb.	SD	280	57	35	no	open	easy	all	no
SGD	SD	800	2	10	no	flexible	not easy	depends	mail
TUC,VDE	SD	1000	5	20	no	flexible	not easy	all	perfect
asp	SD	1700	60	-	not satisfactory	not flexible	not easy	graphics / audio	mails
IPTS	ecp	1000	350	130	yes	flexible	2 days	all	online
SAP AG	SAP-LS	20000	500	10	medium	flexible	2 days	all	online
Akad.Ü.	SD	112	24	5	no	fixed	simple	all	self
VHOberrh.	clix campus	200	6	n.a.	no	depends	good	all	self
ZWH	DLS	n.a.	39	>110	no	flexible	1 day	all	plug-in
BildungPlus	corp.	n.a.	25	40	no-	flexible	user-friendly	all	yes

1.1 Course creation

In the majority of cases there is no course creation with or inside the LMS in fact independent of the origin of the LMS - self-developed or purchased. Institutions which offer specialised courses as supplements for face-to-face lectures, target-group orientated courses or just space for online-cooperation use their LMS for creation of exercises too.

Four institutions declare their LMS as satisfactory for course creation - these LMS are self-

developed. One of the big projects rejects to develop courses with the LMS, "because we don´t want to become dependent on one provider".

1.2 Structure and didactic flexibility - openness.

The answers to the question with regard to "structure and didactic flexibility" permit the conclusion "anything goes". The answer extend from "complete flexible" to "all what a browser can present is possible". Only four institutions work explicit with a didactic frame work (which is changeable too).There seems to be no limits of didactic flexibility for the authors. The structure of the LMSs for differing didactic possibilities seems to be open too. The impression during the interviews was that the answer to the question of openness of the LMSs is a theoretical one - the LMS offers this variation, but they weren´t used anytime.

1.3 Teacher userfriendliness.

Three interviewed persons declared the userfriendliness for teachers and course developers as "has to be improved". The other stated short training periods between four hours and two days. All in all one can say that there should be no difficulties in using the LMS. Some statements apply this to word-processing software, internet basics or an interface for the LMS. Two institutions needs additional qualification for the teacher: competence for studio teaching and certification as telecoach.

1.4 Support for graphics, audio and video, moving image

The support for graphics, audio and video, moving image seems to be problem-free. The majority declared "all media are supported". But that doesn´t mean that all media are used but marked the potential of the various LMSs. Two interviewed people said that all can be integrated that is internet-capable or java-capable.

1.5 Questioning, assessment, assignments

In seven cases there are performance control systems for the students themselves in differing variations for example pre-correction, automatic correction or self-testing procedures. All other statement can´t be summarized. There are differing types of questioning (email-based too), established homework-areas, case-studies and multiple-choice questions. Also entrance-test, newsgroups and chat are mentioned in this area. This mix seems to be e result of the differing "objects" the LMSs is used in - to establish a virtual university or a supplement to face-to-face lecturers, to offer further education online or specialised courses. There is not one LMS using an integrated examination procedure.

2 Student support tools

Institution	LMS	studs	courses	tutors	2.1 interactivity	2.2 student to student	2.3 student to tutor	2.4 resources	2.5 feedback
Virtus, Cologne	SD	12 000	50	30	all provided	news server, no chat	async.24/7	linked	self-control
Teleakad	BlackB.	500	10	50	all provided	all, incl. chat	textbased	none extra	comments
Netzentwurf	SD	100	4	5	all, databased	all is too much	e-mail /video conf.	links	peer control
Virt FHS	Black-B.	1000	130	40	all via portal	all possible	sync= scheduled	possible	tutor
LVU Hagen	(SD)	27 000	270	100	fixed structure	newsgroups	asynchronous	database	on/offline
media-design	Learnlink	700	5	130	all provided	live	telephone /e-mail	online,pdf	on/offline
Osnabr.VC	SD	80	3	8	workgroups etc	asynchronous	face to face +async	www	automated
VU Regensb.	SD	280	57	35	newsgroups	open,incl.chat	all integrated	www	not special
SGD	SD	800	2	10	all possible	all possible	most possible	anything	on/offline
TUC,VDE	SD	1000	5	20	lab. scheduled	asynchronous	e-mail	www	offline
asp	SD	1700	60	-	all	asynchronous	asynchronous	links	on/offline
IPTS	ecp	1000	350	130	all possible	scenarios	live	MS,internal	good feedback
SAP AG	SAP-LS	20000	500	10	all, intranet	e-mail	live, e-mail	inclusive	live feedback
Akad.Ü.	SD	112	24	5	provided	sync + async	e-mail,chat	none extra	tutor
VHOberrh.	clix campus	200	6	n.a.	all (textbased)	all	textbased	in/external	customized
ZWH	DLS	n.a.	39	>110	all possible	all	scheduled +async	internal	within 24hrs
BildungPlus	Corp.Learn	n.a.	25	40	all	sync /async	24/7,+sync	all	not automat.

2.1 Interactivity possibilities

The statements regarding interactivity can be divided into three groups: main focus of interactivity is the communication with others, the working with the content and a combination of both - communication and content.

Interaction as communication was mentioned in nine cases. That include all activities regarding learning groups, message systems, internal and external email-functions, newsproups, chat and newsforum.

Rather content-based interactivities were stated by four interviewed persons - e.g. diaries, self-testing, remote-controllable laboratory, "Try ist yourself" function.

In another four cases communiction as well as content-based activities are stressed as interactivity.

2.2 Online student to student communication

For the student to student online communication the following distribution is found: in seven cases only asynchronous communication, in five cases only synchronous communication and in six cases synchronous as well as asynchronous communication is used.

Asynchronous communication can be done by email, messaging systems, message boards, blackboards, mailing lists and so on. The main type of synchronous communication is done by chat on different levels - and sometimes on extra channels -, net-meetings and group-learning. One institution had offered synchronous possibilities but has given it up because of the lack of users - the target group

memebers study parallel to their respective jobs and don´t want to be hooked into fixed dates.
These results describe mainly the used tools, not all provided by the respective LMS.

2.3 Online student to tutor/institution communication

Communication between student and tutor/institution is mainly settled in analogy to the "student to student communication". The asynchronous form is available 24 hours a day.
Some special conditions have to be mentioned. One system contains a feedback button for sending messages/mails to the system administration (as a global adress). Another LMS has a virtual-classroom-chat with integrated whiteboard functions and synchronous use depends on scheduling. In two cases communication outside the system is used - via mail or telephone.

2.4 Resources, library, references

The student´s acquisition of resources is provided in all surveyed LMSs. The resources may be subdivided into access to library, links to additional documents and instructional materials, links within the courses and other external links. The subgroup "links within the courses" may contain external links too. The table presents a summary of the access to the various resources.

Table of resources, library and references

Institution	links to library	links to documents	links within	external links
Virtus	x		x	x
Teleakad.	x	x		
Netzentwurf	x	x		x
VirtVHS	x			x
LVU	x		x	
media design		x		
UOsnabr.Virt Campus	x	x		
Virt.UniRegensbg.	x		x	x
SGD	x	x	x	x
TUC,VDE			x	
akademie.de,asp			x	
IPTS		x		
SAP	x	x		
AKAD Überl	-	-	-	-
VirtHS Oberrh			x	x
ZWH		x		x
Bildung Plus	p	p	p	p

x= used; p= possible

One LMS has a special literature-button which connects with external references e.g. digital libraries. In another LMS a commercial information service (EBSCO) is used.

2.5 Feedback on work and assignments

In the majority of cases feedback is given by the statements of the tutors. Automatical tests are possible in four cases. Three institutions declare that feedback belongs to the content and because of that into the responsibility of the authors. Two of them offered automatical test - the authors can decide whether they use a more elaborated form of feedback. Another mentioned possibility is described generally as "using communication tools".
The LMS "VIRTUS" doesn´t provide any feedback - "VIRTUS" is a supplement to the exercises area of face-to-face study. In the beginning feedback on students behaviour was evaluated, user-tracking too, but it was stopped.

In the LMS "Netzentwurf" feedback is organized by publishing the steps of work and the final product - the architectural design. That means critique from other people is the regular feedback - "the main didactic element built in the system".

Table : feedback on work and assignment

Institution	Using Communication tools	tutor statements	automatical tests	depends on teacher
Virtus		-	-	-
Teleakad.		x		
Netzentwurf				
VirtVHS			x	x
LVU			x	x
media design		x	x	
UOsnabr.Virt Campus	x			
Virt.UniRegensbg.	x			
SGD		x	x	
TUC,VDE		x		
akademie.de,asp		x		
IPTS	x			
SAP		x		
AKAD Überl				
VirtHS Oberrh		x		
ZWH		x		
Bildung Plus				x

3. Tutor support tools

Institution	LMS	studs	courses	tutor ss	3.1 tracking	3.2 groups	3.3 questions	3.4 monitoring	3.5 admin
Virtus, Cologne	SD	12 000	50	30	separated	rights assigned	open	anonymized	separated
Teleakad.	BlackB.	500	10	50	by tutor	tutor instals	e-mail	by tutor	same tools
Netzentwurf	SD	100	4	5	by address	shared workspace	normal drop-out	weekly report	open platform
Virt FHS	Black-B.	1000	130	40	no database	groupware	question pools	credit account	tutor"course"
LVU Hagen	(SD)	27 000	270	100	directory	by enrolment	by scheme	per course only	WebAssign
media-design	Learnlink	700	5	130	complicated	build subgroups	not optimal	any questions?	telephone
Osnabr.VC	SD	80	3	8	tutor=sysad	groupware	assignments	by comments	separated
VU Regensb.	SD	280	57	35	enrolment	newsgroup	n.a.	n.a.	telephone
SGD	SD	800	2	10	databased	newsgroups	not user friendly	tutor	trackable
TUC,VDE	SD	1000	5	20	elaborated	groupware	tutor version	monthly	tutor=sysad
asp	SD	1700	60	-	data protect	groupware	Mutiple choice	one-to-one	much possible
IPTS	ecp	1000	350	130	logs	role assigning	only synchron.	live	separated
SAP AG	SAP-LS	20000	500	10	databased	studs register	mock exams	logs	integrated
Akad.Ü.	SD	112	24	5	log time	extra groups	to be developed	time oriented	sysad control
VHOberrh.	clix campus	200	6	n.a.	n.a.	groupware	uploaded	logins	not included
ZWH	DLS	n.a.	39	>110	log times	groupware	forms offered	logs	tutor=responsible
BildungPlus	CorpLear	n.a.	25	40	logs	groupware	not much	logs	not much

3.1 Tracking students - database questions

The user-friendliness of tracking students is described as very easy as well as very complicated. The range of information, which tutors can notice differs enormously: names and logins; names, credits and assignments; enrolled courses, overview on each student; done work and results; number of registered students; logins and accessed learning units; taken down learning process and login-times and number of actually enrolled students. Another difference is the right to access the database - if available. In six cases tutors explicitly have no right to access, only the systemadministrators can do so.

There cannot be found a general setting: it seems to depend on the function of the offers - e.g. supplement to face-to-face study or further education - and an (individual) interpretation of data protection law.

3.2 Group management tools

The most simple way is to manage a group of students who are formally enrolled in a course. The allocation of these students is not the task of the tutors. Within the groups there are various rights to administrate the courses, including the right to build subgroups. This happens in many cases by groupware tools with a lot of

cooperation possibilities. In some LMSs group cooperation is organized without an assigned tutor. The main element of one LMS is just the possibility of facilitating groups. Otherwise there are no special tools but the use of chat, newsgroups or other communication tools. One LMS is explicitly described as having "no group product".

Another LMS differentiates - on the synchronous level - the role of a "learning administrator" and a "tutor" (role division). The learning administrator is the person who is responsible for setting up a course: students, course leader and course material. Tutors are not allowed to do so.

3.3 Preparation of questions and assignments by tutor

In this section the answers range from "not user-friendly" to "sophisticated", and not applicable. There exist integrated tools which function very well. The range of methods are: email, question pools, pre-pared schemes, tools for setting up multiple choice questions, uploads and offered forms. In one case the courses contain two versions - a tutor´s one and a student´s one - and they abstain from further support because the experts are in the (spacial) background.
The main problem in this case seems to be a technical one. The creation of questions and assignments without using prepared question pools or schemes or other "light" tools depends on a good technical qualification of the course creators. In the words of an interviewed system administrator: "It is extremely user-friendly for our staff but extremely difficult for external people".

3.4 Course planning for students (monitoring pace)

Monitoring students is realized in various forms and intensity. One has to differentiate between monitoring a single course or monitoring students over a longer period - for instance more than one course. In the case of one course monitoring this is realized in forms as

- weekly reports,
- general questioning "Any question?",
- dispatching the teaching material monthly - like a timetable ,
- logs and logins.

Also comments on exercises and monitoring one-to-one are mentioned.
For the other form - monitoring over a longer period, for instance university studies - the practise is extremely different too. The most elaborated form is the credit-account as a good overview (exams are done face-to-face). Another LMS only uses anonymized monitoring out of data protection reasons. For another LMS it is stressed that monitoring over a longer period is not possible, because the tutor is responsible only for his course and can only see his students. This depends on the organizational structures of universities - there is an examination board collecting the results of student´s work. And this examination board is not part of the LMS.

3.5 User-friendly administrative systems between tutor and institution

In addition to the basic tools for communication the possibility of installing extra courses for mentors/tutors and the (not used) possibility of setting up shared learning spaces are mentioned.
In some other cases the communication is done by "traditional" media - telephone and face-to-face, also if communication tools are available. For other LMSs - mostly private organisations - the institutional aspect is stressed: the tutors carry out their assigned activities, tutor activity can be traced or the tutor belongs to the institution. The direction of communication seems to be very clear.

The general impression is that the tutor to institution communication is a less important aspect of the LMS. This sub-systems can also be served by traditional media, and most of the researched LMSs are easy to understand.

4. Administration aspects of LMS

Institution Identification	LMS	# students	# courses	# tutors	4.1 enrolment procedure	fees	4.2 pw/ssh	4.3 records	4.4 exam database	4.5 tutor db
Virtus, Cologne	ILIAS (SD)	12 000	50	30	Uni-enrolment	nil	pw	manual	manual	admin= open
Teleakademie Furtwangen	Black-board BSCW	500	10	50	manual	nil	pw	access	n.a.	access
Netzentwurf, Karlsruhe	SD	100	4	5	Uni-enrolmentl	nil	pw	documents kept	manual	n.a.
Virtuelle FHS Luebeck	Black-board	1000	130	40	Uni-enrolmentl	nil	pw	manual	grade- book not integrated	UNIX links
LVU Hagen	VU (SD)	27 000	270	100	Uni-enrolmentl	nil	pw	manual	planned	integration planned
media-design, München	Learnlink evoeye	700	5	130	enrolment for 1 year	EURO 15.000	pw, ssh	integrated	separated	EXCEL
Uni Osnabrueck Virteller Campus	VC Prolog Tutor (SD)	80	3	8	Uni-enrolment	nil	pw,ssh	n.a.	n.a.	personalized
Virtuelle Universität Regensburg	planetux (SD)	280	57	35	Uni-enrolment	nil	pw 128 bit	manual	n.a.	form based
Studien-gemeinschaft Darmstadt (SGD)	wave learn (SD)	800	2	10	interface	ca 2000 Euro/ year	pw	no problem	possible	included
TU Chemnitz, VDE	(SD)	1000	5	20	external	nil	pw, ssl	xml databases	possible	included
akademie.de asp GmbH	(SD)	1700	60	none	online	Euro 150	pw, ssl	database	possible: partners job	possible
IPTS Kronshagen	interwise-ecp	1000	350	130	all online	nil	pw	logs possible: not used	not used	possible
SAP AG	SAP Learning solution	20000	500	10	all online	internal	pw, part of portal	integrated into system	test engines used	resource mangement system
Akademie Überlingen	lernen - im-netz (SD)	112	24	5	e-commerce online	online fee 2.70 Euro/hr	pw,ssl	self eval.	external tests	flexible
Virtuelle Hochschule Oberrhein	clix campus	200	6	n.a.	online	nil	pw	n.a.	n.a.	tutors space
ZWH Düsseldorf	DLS from ETS	n.a.	39 systems	>110	online	by institution	pw	no problems	presence phases	admin.only
BildungPlus eLearning Gesellschaft mbH i.G	corporate learning	n.a.	25	40	online, or sent	by institution	pw	n.a.	n.a.	n.a.

4.1. enrolment procedure

Unlike in other countries we do find many projects, where the enrolment as a university student is the only prerequisite for participating in the LMS. This also means that students receive this right to participate together with a password into the university computing system. But what does it mean for the procedures? Is there a link between the LMS and the student database? No, in almost all cases this means that the student just has to identify him/ herself and that no additional fees are expected. It explicitly does **not** mean that the LMS is integrated into the normal university enrolment procedures: on the contrary, in most cases this will be completely separated. The remarks about "double dichotomy" can enlighten the situation. This procedure seems to be standard for most public systems in Germany. Also this is the reason why additional fees on the side of the student are not expected. Then we find one figure 15.000,- Euro in one case where the sum seems to be extraordinary: This sum will be paid by the public, the unemployment agency, to finance the enrolment. Where we learn about the fees for a single student (to be paid per year or semester or even per minute- in one case) we may well esteem the real cost of such systems.

4.2 passwording

All systems are passworded; half of them even with additional security aspects. So administrative bureaucratic arguments would actually not be valid as arguments against integrating the LMS into the normal administrative procedures of the university or agency.

4.3 students records

The ability of a high school student to access the schools database of records has been ten years ago the triggering scene for the movie "War Games." What seemed to be standard procedure in American high schools exactly is the point where German systems deviate: the records database is kept - if at all centrally - at a different place of the administration than the enrolment database. Because of the privacy laws of data protection it is not so easy to change these procedures. So this is the reason why we find in our overview table one third of the LMSs stating "manual" as the procedure to change such records.

4.4 exam database

Actually for this aspect all the remarks concerning records databases are valid, too. We can assume, though that all the LMSs off the shelves do have integrated a link to an exam database, some of these even with additional aspects of test-generating possibilities. But in these cases we learn from our interviews that even wehere there are such aspects integrated they are not used to their full extent (e.g. BlackBoards grade book "not integrated" or where we find "possible").

4.5 tutors database

A good LMS would have such a databse integrated with cross-refence ability eiher for the administrators or even for the tutors themselves, In some cases though, we find the answer "possible" ," integration planned" or some other excuse for not having it integrated as yet.

5. Technology aspects of LMS

Institution Identification	LMS	# students	# courses	# tutors	5.1 Server/ software	5.2 client software	5.3 adaptability	5.4 Size	5.5 speed
Virtus, Cologne	ILIAS (SD)	12 000	50	30	php / sql metatags DC	browser	change during summer	no upper limit	0.1 sec
Teleakademie Furtwangen	Black-board BSCW	500	10	50	back-office MS, BSCW	browser, 28.8 connection	open flexible system	reached upper limit	no multimedia
Netzentwurf, Karlsruhe	SD	100	4	5	MS- ast-server, access, metatagging	standard	flexible system	not yet upper limit	normal
Virtuelle FHS Luebeck	Black-board	1000	130	40	AMS, SCORM metatags	standard	flexible system	not yet upper limit	good
LVU Hagen	VU (SD)	27 000	270	100	two SUN Oracle PATROL	standard	flexible system	not yet upper limit	good
media-design, München	Learnlink evoeye	700	5	130	NT server	provided incl.satellite dish	updates provided	staff limits only	excellent 20xfaster than DSL
Uni Osnabrueck Virteller Campus	VC Prolog Tutor (SD)	80	3	8	php, sql server , DC / Ariadne	any browser	summer updates	none	0.1 sec, no multimedia
Virtuelle Universität Regensburg	planetux (SD)	280	57	35	Dell 1GB RAM, SUN 4 GB RAM	standard	open for changes, RXML, metatagging	none	high, adaptable
Studien-gemeinschaft Darmstadt (SGD)	wave learn (SD)	800	2	10	planned	browser	open for changes, flexible	no problem	soon own system
TU Chemnitz, VDE	(SD)	1000	5	20	LINUX server	browser	open for changes	200 at a time	no problem
akademie.de asp GmbH	(SD)	1700	60	none	LINUX Apache, SQL	browser	flexible, metatags possible	no problem	no complaints
IPTS Kronshagen	interwise-ecp	1000	350	130	SQL,2GB RAM	browser, push technology, fast!	flexible	no problem	very high
SAP AG	SAP Learning solution	20000	500	10	SAP standard	browser	flexible, metatags possible	no problem	very high, Intranet
Akademie Überlingen	lernen - im-netz (SD)	112	24	5	LINUX, php	browser,ISDN, Headset	flexible	tutor resources only problem	DSL, 2-3 sec.
Virtuelle Hochschule Oberrhein	clix campus	200	6	n.a.	LINUX, SQL, Oracle	browser, plugins	flexible	n.a.	satisfactory
ZWH Düsseldorf	DLS from ETS	n.a.	39 systems	>110	no problems	browser, plugins,low end	flexible	no limits	satisfactory
BildungPlus eLearning	corporate learning	n.a.	25	40	MS, SQL	browser,	flexible	no limits	satisfying

5.1 Server/ software

Microsoft or LINUx is one of the alternatives for server software systems for the LMS; Our impression is that all need two central systems, one for the program of the LMS and a separate one for an SQL database.- Some of the interviewees did not answer to the point- this also might be because of the rather great distances between the interviewees and the interviewers who might have misinterpreted the answers because of the reason that they are not experts in technology themdselves. Any how, some of the answers also indicate an inclination to be aware of the problems of standardization (Dublin Core, Metatagging, SCORM).

5.2 client software

In this category we can be secure in stating that for most systems normal browsers will be sufficient. Some of the projects answered the necessary velocity of data connection (ISDN or even better for video-connection e.g.) There is only one technically very interesting system which splits the technology aspects: The system "media design" offers not only a WWW based portal with all the aspects expected from a LMS but also daily satellite broadcastings, This would be much too expensive because it is not via public broadcasting systems (The LVU does have a connection to the FernUniversitäts broadcasting slot of fortnightly public broadcasts) but in the case of mediadesign it is rented from the satellite agency for a couple of hours a day (which costs immense sums of money), and received by a satellite dish which is professionally installed by the LMS.

5.3 adaptability

The unanimous data of LMS appearantly is "adaptability provided". We find only two of the reported systems having slightly fixed systems because they state about adaptability that they will use summer breaks to adapt the systems. So we can assume that this category is felt as a simple necessity LMSs will have to be adaptable to changing needs and situations. But this statement again is a rather flexible one as are such systems: it does not tell about the time lapse of adaptation neither what the number and setup of courses not the number and progress of students is concerned. Technically all seems to be possible. LMSs are too young to make reports about necessary adaptations to changing structures.

5.4 size

LMS unlimited is the result of empirical findings: Only one of the interviewed systems reported that an upper limit has been reached and states that this problem will be solved soon. So neither the limitation of student numbers nor the limits of number of courses provided are real problems for the systems interviewed.

5.5 speed

We find very accurate data here: 0.1 sec or even 20 times as fast as DSL or the rather slow data 0.1 sec because no multimedia is used as yet. Speed is a category of the LMSs interviewed which does not create any problems on the side of the systems: We do not know about the speed of the systems viewed from the side of the users: As expected the speed provided by the systems is much higher than the velocity of learners systems at large. But one expression might be taken as the overall evaluation of the speed problem: no complaints!

6. Price aspects of LMS

Institution Identification	LMS	# students	# courses	# tutors	6.1 cost total	6.2 fees annual	6.3 reduct ?	6.4 maintenance	6.5 training
Virtus, Cologne	ILIAS (SD)	12 000	50	30	open source	nil	nil	5 hrs/week	€ 900 for externals
Teleakademie Furtwangen	Black-board BSCW	500	10	50	n.a.	free	nil	1 fulltime	1 test-week
Netzentwurf, Karlsruhe	SD	100	4	5	own	nil	nil	1 fulltime	1 day
Virtuelle FHS Luebeck	Black-board	1000	130	40	80.000 $l	57.000 $	campus contract	3 fulltime	two days
LVU Hagen	VU (SD)	27 000	270	100	100.000 €	nil	nil	4 fulltime	alongside
media-design, München	Learnlink evoeye	700	5	130	€ 500 /year/studs.	€ 800 /hour(sat)	-	2 fulltime	1 day
Uni Osnabrueck Virteller Campus	VC Prolog Tutor (SD)	80	3	8	n.a.	5000 €(server)	nil	46hrs /month.	2 hrs
Virtuelle Universität Regensburg	planetux (SD)	280	57	35	Public License	nil	n.a.	1 fulltime	4 hrs
Studien-gemeinschaft Darmstadt (SGD)	wave learn (SD)	800	2	10	server,database	nil	none extra	2 1/2 fulltime	1 day
TU Chemnitz, VDE	(SD)	1000	5	20	self devel.	nil	10% of fees?	1 hr /week	1 hr
akademie.de asp GmbH	(SD)	1700	60	€ 30.000	online	none	10-40 studs	40-80.000€ / month	2 fulltime
IPTS Kronshagen	interwise-ecp	1000	350	130	not permitted to tell	n.a.	included	1 fulltime	3 fulltime
SAP AG	SAP Learning solution	20000	500	10	self devel.	n.a.	per 500 price-grading	>1 fulltime	2 days
Akademie Überlingen	lernen -im-netz (SD)	112	24	5	self-devel.	15.000€	2,70 /hr	60%	4000€ /tutor
Virtuelle Hochschule Oberrhein	clix campus	200	6	n.a.	n.a.	n.a.	nil	10.000€	1 day
ZWH Düsseldorf	DLS from ETS	n.a.	39 systems	>110	n.a.	n.a.	none extra	1 day	1 day
BildungPlus eLearning	corporate learning	n.a.	25	40	n.a.	n.a.	n.a.	1 fulltime	4 hrs

6.1 total cost

We do expect little information in this section out of two reasons: In some cases especially in public universities total cost will not be known because it is no category to look for. The reason for that is manifold: universities, as stated already in the section "double dichotomy" have the task to research and train students in exactly such systems so it must be hard to differentiate among cost structures. On the other hand with products "off the shelves" we find some cases where the administration simply forbade to tell exact data. It might be that they received special prices or have the hope to in the future. Only in one case we are given exact data but in most cases

we can figure out by calculating the staff cost on the side of the institutions. So when we look at the reported figures we will find answers in different categories. Installing a complete system mostly meant to buy a new machine and database software, which easily sums up to some €100.000 Euro. But the answers of the majority of projects will hide these cost behind the statement that it is self-developped, open source, or not available (n.a.)

6.2 annual cost

What has been said about installing the system holds true for the second and more years to come: these cost are not calculated, because there is no need to calculate exactly. And proprietary systems are the only ones who do know exact figures but will not tell in all cases: 4 data packages with more or less exact data are provided: We now learn that BlackBoard costs 80.000 and 57.000 each year for the campus contract in the case of Luebeck.

6.3 student cost/ reduction

Almost all respondents state that there is none for the students- the one project which is financed by "online cost" from the student is different in not charging anything else but online fees: that is where they draw their money from. It seems to be a good way to support the systems used, and it does provide a possibility to come to just and balanced cost structures for the system: but is is the only project to use this form of finacing by micro-payment rather than by enrolment fees or other.

6.4 maintenance

If we had no idea what cost structures are involved in running a LMS we would know now by the answers in this category: Also here we learn about the range possible for different but somehow comparable systems: the range is from 1 hr. a week (which we don't believe) over 5 hrs a week up to 4 fulltime with a salary of about €50.000, which sums up to more than€ 200.000 each year. It might be a useful task for researchers to find out about the average yearly maintenance cost per student but the differences among the reported systems are too big to get a sound interpretation.

6.5 training

training for teachers and students had not been differentiated in the questionnaire, so we find answers for both groups: Amazing the range of investment necessary to train people in these systems: between 1 hour for almost self-explanatory systems and three fulltime staff for training (most likely alongside the maintenance tasks) which will certainly include a permanent hotline then; the data are so widespread as is the scope of differences among the systems. It certainly is hard to tell about the cost for training due to the wide range of answers in this question category.

7. Further development

The last question "What features would you like to see included in this LMS in the future?" should give a view to future developments of the used LMS´s.
It is nearly impossible to generalize future options for the LMSs. Options mentioned several times can be grouped as follows:

a) The import and export of complete courses, modules or material should be extended
b) The LMS should be "enlarged"
c) More tools for synchronous communication should be integrated.

The import/export function seems to be the most important issue. This belongs on the one hand to the practical use of import/export of content, but on the other hand the lack of available content is deplored. Furthermore it should be easier for authors to import their own courses. Connected with a better import/export function is the problem of establishing metadata and SCORM/ LOM compatibility.

The second option -the enlarging of the LMS - means the wish that other faculties of the university should take over the LMS. Another position in this direction is the improvement of user-friendliness in order to gather more people to use the LMS – be it as counsellor or be it as colleague.

The third option - more synchromous tools/interfaces - aims at better and extended possibilities of synchronous communication.

As further aspects mobile computing and real-time video conferencing are mentioned.

Summarized one can say that questions of standardization and optimized possibilities of synchronous communication with different tools will play an important role in the future.

List of conclusions from Germany

1. There seems to have emerged a new dichotomy that plays a major role in the development of web education systems. The dichotomy between academia and administration

2. There is a tradition that a bright computing center does not need to buy programs developed by others because the need to buy external programs would question the qualification of existing personel in such centers.

3. The task of such a computing center indeed will necessarily produce a conflict between the university's administration which hoped for increase of effciciency and decrease of performance cost and the department which always has to look for proofs of their respectability tested in - at least- the "own" market.

4. In the majority of cases there is no course creation with or inside the LMS in fact independent of the origin of the LMS - self-developed or purchased.

4. In the majority of cases there is no course creation with or inside the LMS in fact independent of the origin of the LMS - self-developed or purchased.

5. There is not one LMS using an integrated examination procedure.

6. Unlike in other countries we do find many projects, where the enrolment as a university student is the only prerequisite for participating in the LMS. It explicitly does **not** mean that the LMS is integrated into the normal university enrolment procedures : on the contrary, in most cases this will be completely separated.

7. A records or test-database is kept - if at all centrally - at a different place of the administration than the enrolment database. Because of the privacy laws of data protection it is not so easy to change these procedures

8. The unanimous data of LMS appearantly is "adaptability provided".

9. Neither the limitation of student numbers nor the limits of number of courses provided are real problems for the systems interviewed.

10. As expected the speed provided by the systems is much higher than the velocity of learners systems at large.

11. Installing a complete system mostly meant to buy a new machine and database software, which easily sums up to some €100.000 Euro. But the answers of the majority of projects will hide these cost behind the statement that it is self-developped, open source, or not available (n.a.)

12. The lack of available content is deplored

13. Summarized one can say that questions of standardization and optimized possibilities of synchronous communication with different tools will play an important role in the future

An Analysis of Online Education and Learning Management Systems in the Nordic Countries

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Abstract

This article presents the results from an analysis of online education and Learning Management Systems (LMS) in the five Nordic countries. The analysis is based on literature review and in-depth interviews with 20 selected Nordic training managers. The analysis comprises a broad range of institutions from primary education, secondary education, higher education, distance education, and corporate training.

LMS systems seem to be widely used in Nordic education and there is a clear trend towards large-scale online education. The 20 institutions had experiences with 25 different LMS systems and 12 of the institutions now have more than 50 online courses. Higher education institutions have standardized on a few national student management systems, and they prefer LMS-systems developed in the Nordic countries. Among the 25 different LMS systems that were identified in the analysis, 16 were of Nordic origin. All other systems were of American, Canadian, or Irish origin. The research indicates that ClassFronter, WebCT, FirstClass, and BlackBoard seem to be the most used LMS systems. E-learning standards do not seem to have had much impact on online education in the Nordic countries.

LMS systems could have reached a point were user-friendliness, cost effectiveness, and integration with other systems is more important than new features. Some interviewees want to integrate the LMS with existing systems and other services such as student management systems, marketing catalogues, online payment, tracking of textbook shipments, registration of examinations, and multimedia tools.

The institutions do not seem to be especially loyal to, or dependent on, one provider of LMS system. Several institutions prefer self-developed systems. They perceive the commercial systems as expensive and complex and want to develop the systems to support their special needs. They wanted cost effective systems with the ability to handle continuous enrollment and integration with student administrative systems and economy systems. In the future, the open source strategy may have an impact on the LMS market.

Introduction

This article presents the results from an analysis of online education and Learning Management Systems (LMS) in the Nordic countries. A more comprehensive and detailed analysis (Paulsen 2002) is available in the complete, one hundred page report. The analysis is an integral part of the European Web-edu project (www.nettskolen.com/in_english/webedusite/index.html) that provides similar analyses from other regions in Europe. The Nordic analysis is based on literature review and in-depth, qualitative telephone and e-mail interviews with 20 selected Nordic training managers who have comprehensive experience using LMS systems. The interviews were conducted from October 2001 to May 2002 according to an interview guide developed by the Web-edu project team. The interview guide identified the following focal points, which also are discussed in this article:

- The institutions and their LMS systems
- Course development tools
- Student support tools
- Tutor support tools
- Administrative systems
- Technology
- Economic issues
- Overall evaluation
- Features in future LMS systems

The Nordic Scene

The 5 Nordic countries are Denmark, Finland, Iceland, Norway, and Sweden. Sweden has a little more than 8 million inhabitants, Denmark and Finland a little more than 5 each, Norway 4.5 millions and Iceland about 300.000 inhabitants. Together they have a total population of about 23 million. Each country is among the wealthiest nations in the world. The countries are also recognized as advanced users of computers and telecommunication technology. According to the key indicators presented in eEurope's Benchmarking program (http://europa.eu.int/information_society/eeurope/benchmarking/index_en.htm), all five Nordic countries are among the six EU countries that have the highest Internet access in households.

The following paragraphs present an overview of the situation regarding national initiatives on online universities, student management systems, and LMS systems in each of the five countries. The issues are further discussed in the articles *Online Education Systems in Scandinavian and Australian Universities: A Comparative Study* (Paulsen 2002) and *Online Education Systems: Discussion and Definition of Terms* (Paulsen 2002).

Denmark

According to Ranebo (2001) the Danish Ministries of Education and Research initiated a Danish Virtual University in a mission statement on March 27, 2000. The DKr 40 million budget for the period 2000-2003 should be used to support the development of high quality, higher education, web-based courses and provide information about the courses. As one of the interviewees pointed out, this was obviously not a success:

> The universities have autonomous responsibilities for their e-learning strategies. A national initiative to establish a Danish Virtual University broke down as a result of disagreement between the involved partners. The only result seems to be a planned portal providing information about e-learning initiatives.

STADS is the dominant student management system in Danish Universities and colleges. All Danish universities except from the universities of Copenhagen and Aarhus use it. The system is developed by WM-Data in collaboration with the universities.

Scandinavia is an important market for FirstClass and some of its largest customers are in Denmark. Skol-kom has more than 200.000 FirstClass users in Denmark. COM-C and BlackBoard also seem to be important players in the Danish market according to two interviewees:

Blackboard makes advances in Denmark.

BlackBoard seems to grow in the Danish market. COM-C and FirstClass are two alternative, major players.

Finland

According to Ranebo (2001), the 20 Finnish universities have formed the Finish Virtual University (www.virtuaaliyliopisto.fi) as a consortium:

> The Virtual University of Finland is a development project that was initiated by the Finnish Ministry of Education during the year 2000. The project is a step in the realization of the overall strategies that the Ministry of Education presented in 1999 in its Knowledge Strategy for Education and Research 2000-2004.
>
> The aim is for a virtual university, which offers Web-based high standard courses also in the international level, to be set up by the year 2004. Through co-operation involving universities, colleges of higher education, research centers and private alternatives the quality and flexibility of training will be reinforced, and research networks will also be reinforced.
>
> The 20 universities in Finland will form the foundation of the activities and so, in January 2001, they established a consortium. Students who study on a full or part-time basis at the virtual university must be officially accepted at a physical university if they want to get a degree. University students do not have to pay for their studies in accordance with Finnish legislation. However, the universities can also sell courses and commission courses on the open market and thus provide courses with tuition fees for the international market, for example. (Ranebo 2001)

Oodi seems to be the dominant student management system in Finish universities. But it does not seem to have such a dominant position as the SMS systems in the other Nordic countries. One interviewee states:

> There are 21 universities in Finland and there are 11 different LMS systems. 8 of the 21 universities use the so-called "Oodi" SMS system, but only 5 of them have Oodi in real use. Oodi is based on the Windows and Oracle (+Uniface + WebLogic). You can find more about Oodi at the following address, but unfortunately it's available only in Finnish! www.oodi.fi.

The researcher found an Oodi manual in English via a Google search at
http://atk.hkkk.fi/english/manuals/oodiohje_eng.htm

Iceland

According to Ranebo (2001), Iceland has not made any decision to establish a national virtual university:

> In Iceland, no overall decision has been taken by the state to assemble all the higher education efforts in the area of distance learning under a national development programme for Virtual University or Web University. This particular area in higher education is relatively broad in Iceland, and distance learning, as a development area is a matter of top priority politically. Due to the size of Iceland, it is fairly easy to gain a fairly good insight into what is on offer nationally when it comes to distance courses. This might be one reason

why there has not been a need to create a national comprehensive organization. (Ranebo 2001)

The Ministry of Education requires the schools to apply a student management system named INNA. One interviewee states:

> Up till now, we have used a student management named AXEL, which was developed in Iceland. Every school had an individual installation of the same system. Now, the ministry of education requires that all schools use a central web-based system called INNA (www.inna.is). A company called SKYRR (www.skyrr.is) has developed INNA for the ministry of education. Neither AXEL, nor INNA has any integration to WebCT and I cannot see that WebCT will be integrated with INNA in the future either.

Norway

There is no national online university in Norway, but a number of public initiatives that support and fund online education in existing institutions.

In Norwegian higher education, the dominant LMS-system is the Norwegian-developed ClassFronter (www.fronter.com). Some colleges use standard commercial systems, and some institutions have developed their systems in-house. Runnestø and Ristesund (2002, 36) surveyed 54 of Norway's universities and colleges. Out of these, 32 institutions claimed that they offered online education. Several of them had used more than one system as shown in Table .

Table 1. Instances of LMS systems in 54 Norwegian institutions of higher education (Source: Runnestø and Ristesund, 2002)

LMS	Number of instances
ClassFronter	21
In-house developed	9
LUVIT	6
IT's Learning	4
First Class	3
Kark	3
WebCT	3
BlackBoard	2
TopClass	1
Lotus Learning Space	1
TeamWave	1
Response	1

In Norway, two student management systems totally dominate in higher education. The Norwegian universities and some colleges use FS (Felles System) (http://www.fs.usit.uio.no/) and most of the Norwegian colleges use MSTAS (www.enet.no/). The two largest private colleges have chosen alternative solutions. The Norwegian School of Management BI has experiences with Banner and NKI has developed an in-house system called STAS.

Sweden

In Sweden, no LMS-systems seem to be dominant, but a number of standard commercial systems are used. Two of the comments made by the interviewees support this:

The Swedish developed LMS systems are not dominant in Swedish education. There is little national coordination in this field, the universities are very autonomous and the system choices are made locally.

Most of the distance education courses we provide via LUVIT are included in the national network university program, *Nätuniversitet* (www.netuniversity.se). It allows the universities to apply their own online systems and models. In other words, the universities don't need to coordinate their systems or pedagogical models. This is probably good for the universities, but it could be confusing for students who want to follow courses from several universities.

According to personal e-mail communication with Fredrik Rexhammar (March 18, 2002), one of Sweden's leading experts on LMS-systems, Luvit (www.luvit.com), Lecando, Infinity, Grade, Platon, and Web Academy are Swedish providers of LMS systems. In the same e-mail he states that WebCT and Blackboard are the most used foreign LMS systems used at Swedish universities and colleges. In addition, the author has found that the Swedish-developed system PingPong (www.partitur.se) is used by some institutions. An overview of the market for LMS systems conducted in Sweden is available at www.ssv.gov.se/avit/pform2.htm. It lists the following systems: Luvit, Mentor, Telia Instant Education, Maestro, FirstClass, Comenius online, Lecando, Librix, Marratech, PingPong, Surfa och lär, and WebCat.

The three Swedish distance education consortia have received considerable governmental funding since 1993-94. (Hillefors et al, 22 and Ranebo 2001). At most, the three consortia offered 40-50 courses to 5000-6000 students (Hillefors et al, 26). After nearly ten years of operation, their results are not impressive and their funding will be discontinued. Instead, the government has recently established *Nätuniversitetet* (http://www.netuniversity.se) as a new national body to fund and coordinate the activities. In 2002, *Nätuniversitetet* will provide financial funding for the equivalent of 2 350 full-time students at 30 Swedish higher institutions.

All Swedish universities are using the student management system LADOK or LADOK NOVAU that are owned by a consortium of 37 institutions in higher education in Sweden. The LADOK consortium (http://www.ladok.umu.se/) provides the following information at its web site:

> LADOK is a computer based student admission and documentation system for a university or university college. It focuses on administration of undergraduate and graduate students. The system is locally deployed and managed by the institutions.... The LADOK-system consists of two major parts, the admission system and the documentation system. They are integrated and share data, e.g. name, address and other facts about applicants and students.... The system files contain information for student identification, general eligibility for university studies, admission to courses and study programs, registration on courses per semester, course data, credit points from courses, awarded degrees and international studies.... Data from LADOK are exported to the ministry of education and other agencies for follow-up purposes. An important objective of LADOK is to prepare the annual invoice to the government for studies on the undergraduate level at an institution...
> (www.ladok.umu.se/opendok/LADOK_short.html)

Overview of the Institutions and their LMS Systems

The analysis comprises a broad range of institutions from primary education, secondary education, higher education, distance education, and corporate training. But about half of the institutions are characterized as public universities. It includes public and private institutions as well as both providers of LMS services and costumers of LMS services.

Table 2 shows that the analysis includes 20 institutions from all Nordic countries. Five of them are Danish, four Finish, one Icelandic, five Norwegian, and five Swedish.

Table 2. Institutions Sorted by Country

Name of Institution	URL of Institution	Country	Type of Institution
Danmarks Netskole	www.netskole.dk	Denmark	Consortium of public technical colleges
Center for Fjernundervisning	www.cfu.dk	Denmark	Distance education center at business college
The Centre for the Interdisciplinary Study of LearningAalborg University	www.vcl.auc.dk/default-engelsk.htm	Denmark	University centre
Ventures	www.ventures.dk	Denmark	Consortium
University of Southern Denmark	www.sdu.dk/indexE.html	Denmark	Public university
University of Oulu	www.oulu.fi/english/	Finland	Public university
University of Art and Design Helsinki	www.uiah.fi/english.shtml	Finland	Public university
University of Kuopio	www.uku.fi/english	Finland	Public university
University of Tampere	www.uta.fi/english/index.html	Finland	Public university
Comprehensive College in Akureyri	www.vma.is	Iceland	Vocational college with a distance education department
The Competence Network	www.nkn.no	Norway	Commercial provider of LMS-related services
Nettskolen	www.nettskolen.no	Norway	Commercial provider of courses
Nettgymnas	www.nettgymnas.no	Norway	Private secondary school
Globalskolen	www.globalskolen.no	Norway	Semiprivate provider of primary education for children abroad
NKI Fjernundervisningen	www.nettskolen.com	Norway	Private distance education institution
Midthögskolan	www.mh.se	Sweden	Public university
Statens skolor för vuxna	www.norrk.ssv.se	Sweden	Public distance education institution
Skandia	www.skandia.com	Sweden	Global savings company
University of Uppsala	www.uu.se	Sweden	Public university
University of Lund	www.lu.se	Sweden	Public university

Among the 25 identified LMS systems, 11 are listed as "other LMS". This means that it is not the primary LMS system used at the institution at the moment. It could be a system that has been used in the past, a system that is tested for future use, or just a secondary system used for special purposes. It is interesting to observe that Table 3 shows that 11 of the 20 institutions have experiences with one or more "other systems". This indicate that the institutions are not especially dependant on, or loyal to, their providers. This situation is both a result of local autonomy and historic development.

Table 3 shows that there are large variations among the institutions with regard to the number of online courses, tutors, and students.

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The numbers of online courses range from 850 [NKN] to 4 [Skandia]. The high number of courses listed by NKN is explained by the fact that it includes courses from 50-60 course providers. There are however eight institutions that claim to offer more than 100 online courses.

The numbers of online tutors range from 10 or less [Nettgymnas and Globalskolen] to hundreds. Four institutions claim to have more than 100 online tutors. [NKN, NKI Fjernundervisningen, Midthögskolan, and Aalborg]

The numbers of online students range from a few hundreds to several thousands. Even though the numbers regarding online courses, tutors, and students not necessarily are comparable and reliable, one may conclude that most of the institutions offer online education in a large scale. If one characterizes institutions that offer at least 50 online courses as large-scale providers of online educators, 12 of the 20 institutions are characterized as large-scale providers of online education. In a previous international analysis of web-based education (Paulsen 2000) only 3 of the 22 Nordic institutions surveyed in 1998-99 offered more than 50 online courses. The analysis indicates that there is a clear trend towards largescale online education in the Nordic countries.

Table 3 also shows that there are substantial variations in the number of years in use and course duration. The number of years in use range from less than one year to 15 years [NKI Fjernundervisningen]. Eight institutions claim to have up to 2 years experience. Only six institutions have five or more years of experience.

The typical course duration seems to be several months. This is not surprising since most of the institutions in the analysis are educational institutions that traditionally offer longer educational programs to students, not shorter courses to companies.

Table 3. Information about Surveyed Institutions Sorted by LMS

Name of Institution	LMS	Other LMS	# Online Courses	# Online Tutors	# Online Students	# Years in Use	Typical Course Duration
University of Southern Denmark	BlackBoard	BettyCom, EDWIN, FirstClass, COM-C	110	50-60	240 in the department and 15000 at the university	7	
Nettskolen	ClassFronter CourseKeeper		10	15	150+150	2	2-3 months
Nettgymnas	CourseKeeper		6	6		<1	1 school year
Globalskolen	FirstClass	PedIT Imaker	28	10	180+150	1	1 school year
The Centre for the Interdisciplinary Study of Learning, Aalborg University	FirstClass	Virtual-U	11 programs	120	880	8	1 semester
Ventures	FirstClass	None	A number of programs	50	3000	5	Typically on semester, but also offer individual enrollment
University of Art and Design Helsinki	Fle3 - Learning Environment	WebCT	20			4	4-16 weeks

Name of Institution	LMS	Other LMS	# Online Courses	# Online Tutors	# Online Students	# Years in Use	Typical Course Duration
University of Oulu	LC Profiler		41	???	2500 users		Several weeks or months
Skandia	LUVIT	None	4	???	650	2	6 months
University of Lund	LUVIT	Lotus Learning Space	250		6000 of the 23000 students are LUVIT users	5	
University of Uppsala	Ping Pong	FirstClass	50	50	20000 personal accounts, 2000 real users	1.5	0.25-0.5 school year
NKN	Saba	WebLearn Plus	850	hundreds		1	3 hours – 6 months
Danmarks Netskole	Self-developed		40	30	7000 course enrollments	<1	16 weeks
NKI Fjernundervisningen	SESAM (Self-developed)		250	125	3300	15	6 months
SSVN	SSVN2000 (Self-developed)	LEKTOR	50	20-25	500-1000	1	Few weeks – several years
CFU	TopClass	BlackBoard	20	Equivalent of 4 full-time positions	500	4	1-4 months
Midthögskolan	WebCT	FirstClass West	200	Between 100 and 200	2-3000. 40% at a distance, 60% on campus	5	0.5 – 4 semesters
University of Kuopio	WebCT	Verkkosalkku, Verkko-opisto	200		4500	3	40-160 hours
University of Tampere	WebCT		140		3700	3	
Comprehensive College in Aukureyri	WebCT	None	180 online courses, 10-20 apply WebCT	95	750	4	1 semester

Table 4. LMS Systems Sorted by Original Nationality

LMS systems	Original Nationality	Language of LMS	URL of LMS	Institutions using LMS	Institutions using Other LMS
Weblearn Plus		English			NKN
West					Midthögskolan
BlackBoard	American	English, Danish	www.blackboard.com	Southern Denmark	CFU
Lotus Learning Space	American		www.lotus.com		Lund
Saba	American	English, Norwegian	www.saba.com	NKN	
FirstClass	Canadian	Norwegian, Danish, Others	www.firstclass.com	Globalskolen, Ventures, Aalborg	Midthögskolan, Southern Denmark, Uppsala
Virtual-U	Canadian		www.vlei.com		Aalborg
WebCT	Canadian	English, Swedish, Not available in Icelandic	www.webct.com	Midthögskolan, Kuopio, Tampere, Akureyri	UIAH
BettyCOM	Danish				Southern Denmark
COM-C	Danish				Southern Denmark
EDWIN	Danish				Southern Denmark
Self-developed	Danish	Danish		Danmarks Netskole	
Fle3	Finish	Finnish, Swedish, English, Spanish, French	http://fle3.uiah.fi/	UIAH	
LC Profiler	Finish	Finish, English	www.lcprof.com	University of Oulu	
Verkkosalkku, Verkko-opisto	Finish				Kuopio
TopClass	Irish	English, Danish	www.wbtsystems.com	CFU	
ClassFronter	Norwegian	Norwegian, English	www.fronter.com	Nettskolen	
CourseKeeper	Norwegian	Norwegian, English	www.coursekeeper.com	Nettskolen, Nettgymnas	
Imaker	Norwegian		www.imaker.no		Globalskolen
Self-developed: PedIT	Norwegian	Norwegian			Globalskolen
Self-developed: SESAM	Norwegian	Norwegian		NKI Fjernundervisningen	
LEKTOR	Swedish	Swedish			SSVN
LUVIT	Swedish	English, German, French, Chinese, Swedish, Danish, Norwegian	www.luvit.com	Skandia, Lund	
Ping Pong	Swedish	Swedish, English, German, French	www.partitur.se	Uppsala	
Self-developed: SSVN2000	Swedish	Swedish		SSVN	

Table 4 shows that the 20 institutions had experiences with 25 different LMS systems. It is interesting to observe that the majority (16 of 25) of the LMS systems are of Nordic origin. All other systems were of American, Canadian, or Irish origin.

The analysis further shows that 3 institutions (Danmarks Nettskole, NKI Fjernundervisningen, and SSVN) have chosen to use self-developed LMS systems. One additional institution (Globalskolen) states that it will convert to a self-developed system.

The commercial LMS systems that are most widely used among the institutions in this analysis are FirstClass and WebCT. The strong position of WebCT is not surprising, since WebCT and BlackBoard presently are the two dominant LMS systems on the international market

(Observatory on Borderless Higher Education, 2002). FirstClass' European headquarter is located in Sweden. Scandinavia is an important market for FirstClass and some of its largest customers are in Denmark. Skol-kom has more than 200.000 FirstClass users in Denmark. It is also important to know that a comprehensive analysis (Runnestø and Ristesund, 2002) shows that the Norwegian system ClassFronter is very dominant in Norwegian higher education.

The commercial LMS systems are available in several languages, but Nordic institutions prefer to use their national languages. This is a special problem for Iceland, since few providers find it interesting to develop a version for the Icelandic population of less than 300.000 inhabitants. There are also examples of Nordic Institutions that choose to use the English language version, since new versions are first released in English.

Two of the LMS systems in this analysis, Virtual-U and Fle3, are referred to as open source systems. The interviewees who point this out are very positive to this, and it will be interesting to see if the open source strategy will be able to compete with the other commercial systems.

Course Development Tools

The interviewees have different views on how satisfactory the systems are for course creation. But, the LMS systems are usually not used for development of the course content. A broad range of external tools is used to develop the content before it is published in the LMS system. The interviews show that the LMS systems use text, multimedia, sound, html-pages, graphics, and tests that are developed with external software. The software tools for course creation referred to in the interviews are listed in Table 5

Table 5. Software Tools Used for Course Creation

Software tool	Type of content	URL
Word	Text	
PowerPoint	Text	
Macromedia Authorware and Director	Multimedia	
Flash	Multimedia	
Windows SoundRecorder	Sound	
Wimba	Sound	www.wimba.com
FrontPage	HTML-pages	
DreamWeaver	HTML-pages	
Netscape Composer	HTML-pages	
Viewlet	Graphics (Screenshots)	www.qarbon.com
Coral	Graphics	
PhotoShop	Graphics	
ReadyGo		www.readygo.com
ToolBook		
Autotest	Tests	
Webwinder	Tests	www.webwinder.com/quiz/quiz_MC_Ref.html

Development of course content is not trivial, and teachers rarely develop course content without support from others. They seem to use content developed by others, collaborate, or work in teams. Some teachers participate in development courses, have support by web-designers, or support staff.

Reusability and sharing of content could be useful. Export features, archive functions, and standards could make this easier. Several comments indicate that the systems are perceived as flexible and open to differing didactic possibilities. But a few comments indicate that some systems could be perceived as inflexible with regard to didactic possibilities. To make course development easier or to increase productivity, some institutions provide or require that the content must adhere to special structures or templates. However, institutions that do not use the commercial systems maintain that their systems are especially designed and used to support their chosen didactics.

In some cases, individual teachers design the content. In other cases, the teachers do not develop the course content themselves. But, it seems to be common that teachers collaborate or work together with other specialists to develop course content. Some claim that their system is easy to use by teachers and course developers. But obviously some support and training for teachers is useful. This could include contact with experienced tutors, teacher training, dedicated discussion forums, and support services.

Generally the interviewees confirm that the LMS systems support a wide range of media types. Most institutions seem to apply some multimedia. But, several interviewees are cautious about

too much use of multimedia due to bandwidth limitations or lack of development tools. And other institutions seem to be even more cautious about including online video.

Assignment and assessment is a complex topic that should be applied in a pedagogic framework. The most frequent mentioned type of online test is multiple-choice questions. Among the other types of assignments and assessments mentioned are interactive assignments, quizzes, portfolio assessment, and surveys. Some of the interviewees are skeptic to computer-based assessment since it does not correspond to their pedagogical model or teaching tradition. Some of the systems have no built in tools for assignments or assessment. However, there are external tools that could be used to design assignments. The interviewees especially mentioned Autotest and Webwinder. WebCT seems to provide a range of useful tools. LUVIT, PingPong, Saba, and SSVN2000 also seem to provide useful tools for assignment and assessment.

Student Support Tools

There are user groups, such as sales people that work together in one company, that do not ask for online communication. But, the LMS systems seem to provide a lot of opportunities for student interaction through e-mail, distribution lists, discussion forums, chatting, bulletin boards, whiteboards etc. Discussion forums seem to be the most important tool for group communication. The institutions often organize a number of forums for various user groups and purposes. But, use of e-mail is also important, especially for institution with individual course progression. Chatting requires discipline and could be improved technically, but it has several interesting applications such as for example to reduce costs related to international communication. Among the other features that were mentioned for improving student interaction were tracking, integrated FAQ-services, personal presentations, pictures, and class lists. Finally, some comments reflected on students' opportunities to interact with the course material, the environment, and other students.

Many, but not all LMS systems, offer tools for both synchronous and asynchronous communication. Some institutions add external communication tools to offer additional communication services such as chatting, audio chatting, audio conferencing, and sharing of documents. Asynchronous communication via discussion forums and e-mail seem to be the preferred services for student-to-student communication. Several of the systems seem to provide some form of chatting as a tool for synchronous communication. The experiences with chatting are varying. It could be useful for social purposes and for informal communication in smaller groups. But several institutions limit the use of chatting since it is inflexible in time. Chatting may however be useful for formal project meetings.

Technical and administrative support is a challenge that requires more or less resources. Both the numbers of support staff and support hours differ. Support is not available 24 hours a day, but some institutions offer support after normal office hours. The communication with tutors is handled both via e-mail and discussion forums. One institution claims that it guarantees students response from tutors in less than 48 hours.

In general, the systems seem to have limited use of library resources. The most common services are links to existing internal and external Internet resources. Some institutions provide special services such as online journals, articles, library services, and bookshops for their online students.

Some comments indicate that the LMS systems need improved functionality with regard to feedback on work assignments. And tutors seem to be pivotal with regard to feedback on work

and assignments. It is interesting to observe that some systems provide special mailboxes for submission of assignments, opportunities for online registration and presentation of grades, and real-time accounts for individual teacher remuneration.

Tutor Support Tools

Some institutions do not express a need for automatic tracking of student progression since their performance is measured by tutors or work competence. Tracking of students could, however, be useful for administrators, tutors, and students. But, one should be aware that some students are apprehensive about being monitored. Most systems seem to have some tracking of what students have done and when they did it. This may include which assignments they have completed, which web pages they have opened, and which tests they have taken. WebCT seems to provide tracking services that the users are satisfied with. They include tracking of quiz scores, log ins, pages accessed, and comments written. A few interviewees focus on the systems' ability to provide advanced administrative reports on enrollments, course activity etc.. The self-developed SSVN2000 tracking system is especially interesting since it provides excellent tracking of students with individual progress plans.

Group management includes tasks such as entering information about students, classes and the services they should have access to. This is easy to handle with few students, but could be much work in a large-scale system. Many systems allow teachers to form groups and establish discussion forums. Other systems rely more on system administrators for group management. In some systems, students may establish services such as chatting sessions and group calendars.

Some comments express lack of functionality and tools for grading and examination results. Other comments indicate that there are many options and tools available for online assignments and that course designers should utilize the special pedagogical opportunities that are available online.

Some interviewees focus on the ability for teachers or students to follow the students' activity and progress. Other interviewees describe the administrative challenges of tracking students with individual progress plans.

Some comments express a need for improved administrative systems between tutor and institution. The contact between tutors and the institution could be supported by special contracts, separate discussion forums, support services, face-to-face seminars, and training.

Administration

Some institutions have no need for integration between the LMS system and the economy system because they do not charge any tuition fees. WebCT does not seem to offer any support for payment of fees. NKI has developed the SESAM LMS system, which is fully integrated with the economy system. Most of the institutions have separate economy systems with little integration with the LMS. Some, do however, express ambitions and needs for such integration. Online payment via credit cards and special counters for calculation of variable fees could be implemented. NKN has special needs since it also handle online enrolment to face-to-face courses.

Most of the institutions provide students with individual passwords. There are, however, examples of simple solutions in which many students share one password and advanced solutions that allow individual students to have just one password to all university systems. Most institutions seem to be pleased with their password systems. But there are diverging opinions on the workload generated by students who forget their passwords. User management

could represent a heavy workload, which could be organized and automated in several ways. It is necessary to have a strategy for terminating the passwords. Distribution of virus could be reduced if the discussion forums are designed properly and encryption could be used to provide secure connections.

The interviews indicate that the LMS systems are not especially successful for storing and retrieving student records. One institution has established a project to integrate the LMS with the student administrative systems; another sees this work as a major challenge. Other institutions have developed separate databases for information that is not handled by the LMS. Several institutions comment on the needs and efforts to integrate the LMS systems with national student management systems in Sweden (LADOK) and Denmark (STADS). The users of SESAM, CourseKeeper, and Saba claim to have LMS systems that are well integrated with the student records databases.

Some systems do not include examination and certification records. Other systems provide online information about grades. Several of the interviewees are concerned about the opportunities and challenges regarding integration with the administrative system that records the student grades. One interviewee from Denmark was concerned about privacy issues and how much information the systems should handle with regard to examination and certification records. Finally, one of the interviewees stated that exams should be larger and more project oriented to become more supportive of online education.

Some of the interviewees provide positive statements about the facilities for administration of courses, classes and tutors. Other statements are more negative. It is especially interesting to observe that several systems seem to lack facilities and services on the level above individual courses.

Technology

There are some free LMS systems that follow the open source policy, and the two users of open source systems were positive to open standards. There seems to be three categories of server solutions, and all seem to work well. In the first category, the institutions have access to commercial service providers that host the LMS. In the second category, the institutions host the LMS for internal use. And in the third category, the institutions host the LMS for internal use and as a service for other institutions. The institutions that have access to a service providers that hosts the LMS seem to be positive to the solution, but they experience some problems with limited access. Several institutions have chosen to host the LMS internally. They are typically either the institutions that have self-developed systems or larger institutions with high internal ICT competence that can operate commercial LMS systems locally. The users of the commercial systems claim that the systems are stable and reliable. The users of self-developed systems also experience few problems. Virus attacks and firewalls, however, are mentioned as serious problems. A few institution that have self-developed systems hosts the LMS for internal use and as a service for other institutions. One benefit of this is cost sharing.

FirstClass depends more on client software than other LMS systems. Other comments point out that there is no need for any special client software. But, problems with firewalls could be difficult to solve. The institutions seem to differ on how much they rely on necessary client software for special courses. Several institutions seem to minimize the need for additional client software. But some special courses and subjects, for example about statistics, require additional client software. And other systems and courses rely with more or less success on additional client software such as special plugins or Microsoft Office products.

LMS systems could be perceived as flexible, since both course content and system services could be updated regularly. Technology and templates limit the flexibility of the didactics, but it may increase the productivity. The interviewees are aware of the e-learning standards specifications, and several claim that their system follow the standards. But few claim that the standards are important to their institution.

The interviewees talk about LMS systems as large-scale systems capable of handling thousands of users. The interviewees are confident that the systems can handle a large number of users without special technological problems. The interviewees did not seem to be concerned about how the systems technically could organize the administration of large numbers of students, courses, and tutors. One mentioned, though, that large-scale operation could impose some pedagogical challenges.

Some comments express the fact that students have all kinds of connections to the Internet ranging from low speed modems to broadband access. But the speed of the LMS system does not seem to be any problem. The bottleneck seems to be the network bandwidth and local lines. To handle this, the institutions adapt their bandwidth requirements to the users' equipment. Due to the bandwidth limitations, several of the institutions limit their use of high bandwidth content.

Economic Issues

Some of the interviewees view the cost of the LMS as confidential information. Others say that it is hard to estimate or that they don't know it. The main costs reported on self-developed systems are related to a few positions in a development team and to server hardware and software. The costs and pricing structure for the commercial systems vary from system to system. This could make it difficult to compare the real prices. The costs mentioned range from under 5000 euros to over 100000 euros per year. None of the interviewees expressed sincere concern about high prices.

One obvious advantage with self-developed systems is that the institutions pay no annual fees. The commercial systems have various pricing structures and prices for annual fees. The fees could depend on the number of user licenses, the number of years the contract is signed for, or just for actual upgrades.

The Swedish and Finish institutions report that they have no tuition fees. Institutions in Denmark, Norway, and Iceland do report that they charge tuition fees, although many of them also receive additional funding from the state. The research did not find any examples of institutions that had implemented online invoicing.

As the number of users in an LMS system grows, it seems necessary to divide the management and maintenance responsibilities among a number of people. It seems like the interviewees have vague knowledge about the systems' maintenance and operation costs. The issue is perceived as complex and hard to estimate. The costs could be funded externally and it seems to include part-time work for from one to six internal people, but it could also constitute a fee per student to the ICT-department.

It seems like the interviewees have little knowledge about how much time and money that is spent on training staff and students to use the LMS systems. The external costs could be low, since training primarily seems to be handled by internal staff.

Overall Evaluation

There were several positive comments about the Nordic commercial systems. The systems were characterized as immediate, flexible, and open. The interviewees focused on their ability to save time and increase quality of learning, as well as their strong communicational and statistical features. It is especially interesting to observe that the interviewees value systems that support Nordic pedagogical traditions and national, academic user groups. The negative comments about the Nordic commercial systems were related to incompatibility with other platforms and products, limited student privileges, and the provider's uncertain financial situation.

The comments on overall evaluation on WebCT were predominantly positive. The interviewees used phrases such as: a good choice, offers all basic tools, works reasonably well, moderately cost effective, and easy to use. But, it could be hard to get support for local adaptations in Iceland. For example, WebCT version 3 was not available in an Icelandic version.

The positive comments made about other commercial systems used terms such as simple, flexible, well working, many features, very satisfied, and provides most of the functionality we need. The most noteworthy negative comment about the other commercial systems was related to FirstClass' use of client software.

The users of self-developed systems are also satisfied with their systems. Some of the reasons for their choice are that they perceive the commercial systems as expensive and complex and that they can develop their systems to support their special needs. Among the advantages that were mentioned were the ability to handle continuous enrollment, cost effectiveness, and integration with student administrative systems and economy systems.

Features in Future LMS Systems

LMS systems could have reached a point were user-friendliness, cost effectiveness, and integration with other systems is more important than new features. Some interviewees want to integrate the LMS with existing systems and other services such as student management systems, marketing catalogues, online payment, tracking of textbook shipments, registration of examinations, and multimedia tools. Others would like to have more flexible systems and tools. Several would like more use of multimedia, especially with regard to audio and video services. Some topics and languages need better representation of characters, symbols and user-interfaces. Other features the interviewees would like to see in the future were alternative ways to organize and visualize the learning process, better tools for synchronous communication, better ways to personalize design elements, and more national and international collaboration.

Important Findings

The analysis resulted in a number of important findings that are listed in the following and sorted according to Nordic issues, integration issues, economic issues, and issues of special interest to providers of LMS systems.

The following findings are especially related to Nordic issues:

I. LMS systems seem to be widely used in Nordic higher, further, and continuing education. It is not easy to find such Nordic institutions without experiences with LMS systems.
II. The analysis indicates that there is a clear trend towards large-scale online education in the Nordic countries. It shows that 12 of the 20 institutions offer at least 50 online

courses. According to a 1998-99 analysis, (Paulsen 2000) only 3 of 22 surveyed Nordic institutions offered more than 50 online courses three years ago. Further, the interviewees talk about LMS systems as large-scale systems capable of handling thousands of users.

III. The Nordic universities have standardized on a few national student management systems. The systems are LADOK (Sweden), MSTAS (Norway), FS (Norway), STADS (Denmark), INNA (Iceland) and to some extent Oodi (Finland).

IV. Nordic institutions seem to prefer LMS-systems developed in the Nordic countries. Among the 25 different LMS systems that were identified in the analysis, 16 were of Nordic origin. All other systems were of American, Canadian, or Irish origin.

V. The research indicates that ClassFronter, WebCT, FirstClass, and BlackBoard seem to be the most used LMS systems in the Nordic countries.

VI. The interviewees are aware of the e-learning standards, and several claim that their systems follow the standards. But few state that the standards are important to their institution, and e-learning standards do not seem to have had much impact on online education in the Nordic countries.

Other important findings are related to the increasing need for integration between LMS systems and other online education systems:

VII. LMS systems need to be integrated with a number of other systems in an organization that aims at providing efficient, large-scale, online education.

VIII. The integration between the LMS systems and the student administrative systems seems to be relatively poor.

IX. The integration between the LMS-systems and the economy systems seems to be very poor.

X. Several of the interviewees are concerned about the opportunities and challenges regarding integration with the administrative system that records the student grades.

Cost effectiveness becomes more important as the institutions become large-scale providers of online education, and the following findings are related to economic issues:

XI. The costs and pricing structure for the commercial systems vary from system to system. This could make it difficult to compare the real costs.

XII. The interviewees have vague knowledge about the systems' maintenance and operation costs. The issue is perceived as complex and hard to estimate. Further, it seems like they have little knowledge about how much time and money that is spent on training staff and students to use the LMS systems.

Finally, these findings should be of special interest to providers of LMS systems who want to compete in the future market:

XIII. The institutions do not seem to be especially loyal to, or dependent on, one provider of LMS system. The majority of the institutions had changed system, planned to change system, or operated secondary systems.

XIV. LMS systems could have reached a point were user-friendliness, cost effectiveness, and integration with other systems is more important than new features.

XV. The open source strategy may have an impact on the future LMS market.

XVI. LMS systems are usually not used for development of course content. A broad range of external tools is used to develop the content before it is published in the LMS system.

XVII. It is especially interesting to observe that several systems seem to lack facilities and services on the level above individual courses.

XVIII. Several institutions prefer self-developed systems. They perceive the commercial systems as expensive and complex and want to develop the systems to support their special needs. They wanted cost effective systems with the ability to handle continuous enrollment and integration with student administrative systems and economy systems.

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The ABCs of E-Learning
The use of Learning Management Systems in the Czech Republic and Slovakia

by

Mária Mičincová

Abstract

This article presents outcomes from an analysis on online education and Learning Management Systems in the Czech Republic and Slovakia. 14 In-depth interviews have been conducted with public as well as private institutions.

The Candidate Countries (CC13) are fully aware that they must make greater efforts than the EU Member States (EU15) if they are to be a part of the future, integrated European Information Society. Although most countries have made significant progress since the reform process began in the early 1990's, there are still many areas where the current situation is still far behind that of most EU Member States. For example the average access/use of a computer is 45% in EU15 and only 25% in CC13 or access/use of Internet represents 30% in EU15 and 18% in CC13.

The implementation of the *e*Europe+ 2003 Action plan is based on a simple strategy, namely on the one hand it is based on a common set of actions (clearly identifiable, concrete actions and target dates) contained in elaborate national eStrategy Plans in each of the Candidate Countries, while on the other hand the actions are directly linked to *e*Europe 2002 and to the next phase *e*Europe 2005 in order to ensure a broader European relevance and to avoid a digital divide with the EU.

Czech and Slovak e-learning and the use of LMSs is finding its stable position and muddling through financial obstacles, lack of political will and general mistrustfulness. Nevertheless the 14 interviewed institutions have experience with 10 LMSs. The most used system is Czech TUTOR2000 (currently by 5 institutions). 3 interviewees have developed their own systems and the last 6 represent American commercially available LMSs (BlackBoard, Click2learn, GLN {Cisco}, Intralearn, LearningSpace and WebCT).

9 from 14 interviewed institutions have not been using LMS longer then one year. That shows the general very early start of online education in these countries. In spite of that there is already a quite high number of students included in the courses (up to 4005). This market is noticing a high acceleration of this development and it might be predicted into future as well.

Introduction

This paper refers to online education and LMSs in the Czech Republic and Slovakia.

Table 1. Geographical and Demographical data on the Czech Republic and Slovakia

Country	Language	Geographical Area (sq. km.)	Population (million)
The Czech Republic	**Czech**	78 864	10.287[24]
Slovakia	**Slovak**	49 035	5.389[25]
Total		127 899	15.676

The survey ran in two stages:

I. In the first stage research on institutions, which are active in the e-learning field and possibly use LMS, had been conducted. Many times there was the chance to speak to the responsible people from various institutional bodies including the main universities, private companies providing online education as well as LMS providers/vendors, who brought an objective picture of the country situation into the study. With their advice a high number of potential respondents have been contacted and they all have received a translated interview guide in Slovak[26]. There were seven main parts identified in the Web-edu project questionnaire:

1. Course development tools
2. Student support tools
3. Tutor support tools
4. Administration
5. Technology
6. Price aspects
7. Conclusion:
    a) Overall evaluation
    b) Features in future LMSs

II. In the second phase the institutions had been interviewed during the time period March-May 2002, the questionnaires were collected and translated back into English. Interviews with 14 institutions, 10 from the Czech Republic and 4 from Slovakia, create the basis for this analysis. Among interviewees are:

- *Academic institutions*: universities, colleges, faculties, units belonging to universities;

[24] Source: Czech Statistical Office, figure from March 2002, http://www.czso.cz/eng/angl.htm
[25] Source: Slovak Demographic Research Centre, figure from August 2002, http://www.infostat.sk/vdc/explorer/pophoden.htm
[26] Remark: Czech and Slovak language is very similar and there is no problem e.g. for a Slovak students to study in the Czech Republic or vice-versa.

- *Other institutions*: private companies using LMS for internal purposes, private companies providing online courses as their core business, civic association providing education.

This analysis could not have been carried out without the kind assistance and help of many people and institutions. We would like to express our thanks to them all for their support, provision of their experience and expertise.

Background

The EU Candidate Countries are faced with enormous challenges in their attempt to catch up the EU development in several spheres, including the development of a knowledge-based economy. The process of transformation from a planned to an open market economy is taking place at the same time as accession to the European Union. The unequal starting points of the Member States and Candidate Countries have been already recognised by both sides and are described in the following sections.

Technological setting

According to the survey Candidate Countries Eurobarometer 2001[27] (one of the tools of European Commission's Public Opinion Analysis

[27] Sample Specifications

Between the 1st and the 28th of October 2001, The Gallup Organisation Hungary carried out wave 2001.1 of the Candidate Countries Eurobarometer (CCE), at the request of the EUROPEAN COMMISSION, Directorate-General Press and Communication, Public Opinion Analysis. Its methodology is almost identical to that of the Standard Eurobarometer being conducted from 1973 in the EU through approx. 1000 face-to-face interviews per Member State. Therefore this was the first time that the results could be compared. CCE replaces the Central and Eastern Eurobarometer which was carried from 1990 to 1998.

The Candidate Countries Eurobarometer 2001.1 covers citizens of each of the countries that are applying for European Union membership aged 15 and over, with the exception of Estonia and Cyprus. In Estonia, the survey covered permanent residents aged 15 and over. In Cyprus, the survey only covers citizens living on the southern part of the island. The basic sample design applied in all Candidate Countries is a multi-stage, random (probability) one. In each country, a number of sampling points were drawn with probability proportional to population size (for a total coverage of the country) and to population density.
For doing so, the points were drawn systematically from each of the "administrative regional units", after stratification by individual unit and type of area. They thus represent the whole territory of the Candidate Countries Region according to the EUROSTAT NUTS 2 (or equivalent) and according to the distribution of the resident population of the respective nationalities in terms of metropolitan, urban and rural areas. In each of the selected sampling points, a starting address was drawn, at random. Further addresses were selected as every Nth address by standard random route procedures, from the initial address. In each household, the respondent was drawn, at random. All interviews were face-to-face in people's home and in the appropriate national language. In countries with significant minorities the respondents had a chance to respond in their mother tongue (in Estonia, Latvia and Lithuania in Russian, and in Romania in Hungarian).

Data used in Candidate Countries Eurobarometer 2001

Country	BG	CY	CZ	EE	HU	LV	LT	MT	PL	RO	SK	SI	TR	Total
# of interviews	1000	500	1124	1000	1016	1004	1006	500	1001	1010	1044	1000	1000	12077
Population x 000	8,487	663	10,229	1,446	10,198	2,439	3,701	379	38,666	22,546	5,391	1,986	56,473	162,604

http://europa.eu.int/comm/public_opinion/cceb_en.htm), which was released by European Commission (from the fieldwork of October 2001) in March 2002, following results can be seen.
In **table 2** the selection of the most relevant kinds of information technologies is stated for all 13 Applicant Countries. Except introduced technology types the survey provides information also about the access or use of a: video player or recorder; fax; satellite dish; television fitted with teletext; CD-ROM or CDI-reader; or none of these as you will see in the **figure 1.**

Table 2. Access to modern information technology (%by country)[28]
Question in the survey: *Do you have access or do you use...?*

Country	A computer	The Internet, the World Wide Web	A modem	A mobile phone
The Czech Republic	44	31	17	64
Slovakia	29	18	10	43
Bulgaria	14	11	7	14
Cyprus	49	34	23	58
Estonia	35	32	19	56
Hungary	29	16	12	47
Latvia	35	24	11	45
Lithuania	26	18	9	41
Malta	38	28	22	57
Poland	33	21	16	39
Romania	18	10	6	26
Slovenia	53	39	36	76
Turkey	18	16	8	51
AVARAGE CC13	25	18	11	43
AVARAGE EU15[29]	45	30	25	Not measured in SEB 55.1

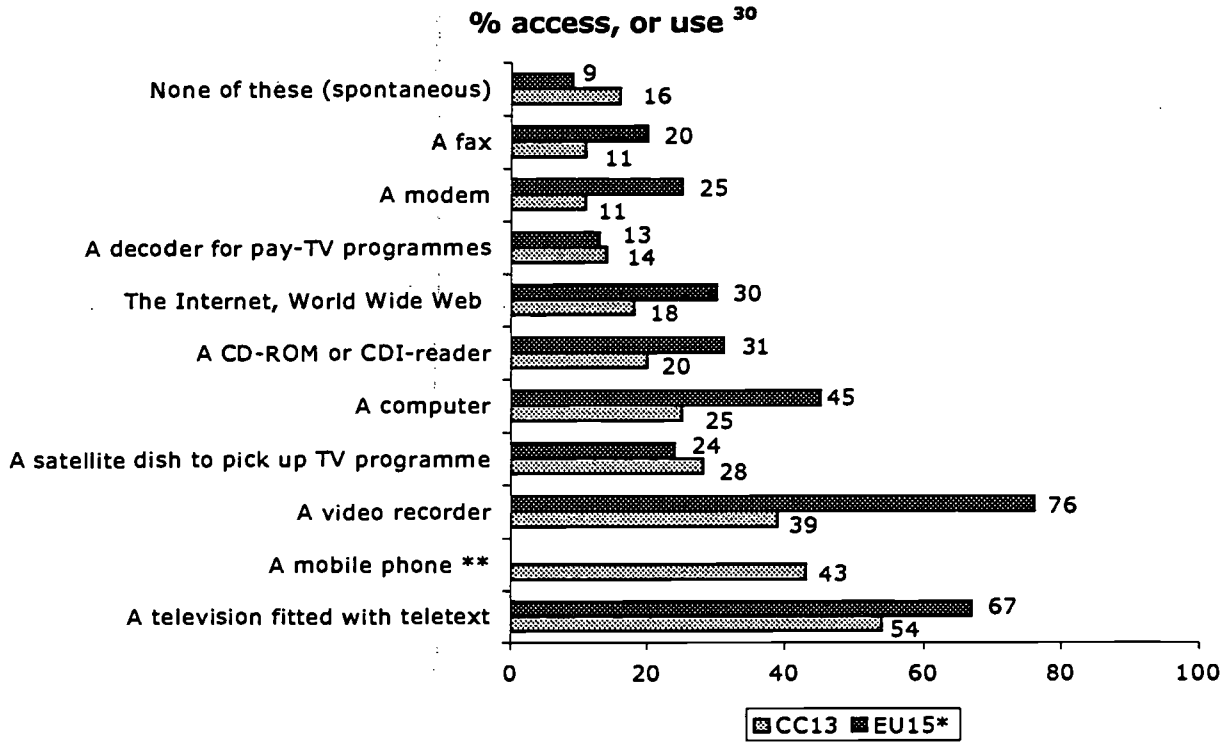
As it is seen from the **table 2** the most advanced country from the CC13 in "Information technology" is Slovenia, where more than the half of the population works with the PC and almost 40% have the access to the Internet. In these two mentioned criteria then only Cyprus exceeds the EU average values and the Czech Republic is very close to these figures. Slovakia stands worse than Estonia, Latvia and Malta as well as Poland is a bit ahead. We can say that Slovakia is more or less on the average of CC13. However we have to consider that these indicators are deformed by a high number of inhabitants of less advanced countries as Romania and Turkey, then Slovakia actually would be placed at the end positions of the ranking.

For each country a comparison between the sample and the universe was carried out. The Universe description was derived from population data from national statistics. For all Candidate Countries a weighting procedure, using marginal and intercellular weighting, was carried out, based on this Universe description. As such in all countries, gender, age, region NUTS 2, settlement size, household size, and education level were introduced in the iteration procedure. For international weighting (i.e. CC averages), Gallup applies the official population figures as provided by national statistics. See above in the ***Table.***

[28] Source: Candidate Countries Eurobarometer 2001.1, October, 2001
[29] Source: Standard Eurobarometer (SEB) 55.1, Apr-May, 2001

In following **figure 1** the comparison between average data of EU15 and CC13 is clearly showed. In this respect the Candidate Countries lags significantly behind the European Union.

Figure 1. ***Access to Information Technology***



Ongoing initiatives

In order to eliminate this huge gap between EU Member States and New Incomers special initiatives have been launched.

At the European Council held in Lisbon on 23-24 March 2000, the Heads of Government and State of the EU-15 set the ambitious goal for Europe for the next decade to become *"the most competitive and dynamic knowledge-based economy in the world".* It recognised the urgent need for Europe to quickly exploit the opportunities of the knowledge-based economy and in particular the Internet. To achieve this objective a comprehensive ***eEurope Action Plan / eEurope 2002*** (http://www.europa.eu.int/information_society/eeurope/action_plan/pdf/actionplan_en.pdf) was developed and adopted by the European Commission in May 2000 and finally launched in Feira on the 19-20 June 2000.

At the European Ministerial Conference held in Warsaw on 11-12 May 2000, Central and Eastern European Countries recognised the strategic goal set by the EU-15 in Lisbon and agreed to embrace the challenge set by the EU-15 with eEurope and decided to launch an ***"eEurope-like Action Plan" / eEurope+ 2003*** (http://www.vus.sk/is/doc/eEurope%2Ben2001.pdf) *by and*

[30] Source: Candidate Countries Eurobarometer 2001.1, October, 2001
*Source: Standard Eurobarometer 55.1, Apr-May, 2001
**Mobile phone access was not measured in Standard Eurobarometer 55.1

for the Candidate Countries as a compliment to the EU political commitments in order to try and broaden the base for achieving the ambitious above mentioned goal. In February 2001, the European Commission invited Cyprus, Malta and Turkey to join the other Candidate Countries in defining this common Action Plan.

The ***eEurope+ Action Plan / eEurope+ 2003***, launched at the occasion of the Göteborg European Council (15-17.6.2001), mirrors the priority objectives and targets of *e*Europe and defines actions specific to the situation in the Candidate Countries.

Actions in *e*Europe+ are clustered around the same three main objectives identified in *e*Europe (see **Table 3**) and the same indicators selected by the EU-15 are adopted for monitoring and benchmarking of the progress. However, the Candidate Countries recognise that, if the full benefits of the actions are to be achieved, a further acceleration in the effective implementation and functioning of the *acquis communautaire* in areas related to Information Society is required. This has resulted in the inclusion of an additional, new objective (zero objective and the other three are the same as in *e*Europe 2002), not previously found in *e*Europe, that aims to assist in putting in place the fundamental building blocks of the Information Society. Furthermore attainment of the *e*Europe+ objectives can be significantly enhanced and accelerated through cross-border and international collaboration.

Table 3. Objectives in eEurope + 2003[31]

0. Accelerate the putting in place of the basic building blocks for the Information Society	a) Accelerate the provision of affordable communication services for all
	b) Transpose and implement the *acquis* relevant to the Information Society
1. A cheaper, faster, secure Internet	a) Cheaper and faster Internet access
	b) Faster Internet for researchers and students
	c) Secure networks and smart cards
2. Investing in people and skills	a) European youth into the digital age
1.	b) Working in the knowledge-based economy
2.	c) Participation for all in the knowledge-based economy
3. Stimulate the use of the Internet	a) Accelerating e-commerce
	b) Government online: electronic access to public services
	c) Health online
	d) European digital content for global networks
	e) Intelligent transport systems
	f) Environment on-line

Outcomes

Currently there was already a ***Progress Report on the implementation of the eEurope+ 2003 Action Plan in the Candidate Countries*** published(http://emcis.gov.si/mid/emcis.nsf/V/K89BFB6D139731A05C1256BCA00444679/$file/Progress_report.pdf), which was presented during a conference in Ljubljana (Slovenia) on the 3rd and 4th June. Ministers and other representatives from the 13 Candidate Countries and several EU Member States met there on the invitation of the Slovenian Government and the European Commission.

The results are mirrored by press releases from June 2002 about eEurope+ Action Plan discussed in Ljubljana:

Presenting key figures from the report, Robert Verrue, who is Director General of the European Commission's Directorate General for the Information Society, underlined the importance of progress made by the candidates in the "building blocks", namely, legislation in this field. Quoting figures from the report, Verrue pointed out that the applicants have harmonised 80 percent of their telecommunications laws to EU legislation. Moreover, Verrue also pointed to the fact that the applicants are taking steps to improve basic access to communications, thus catching up with the member states in this field. The European Commission official thus pointed to the percentage of households with fixed telephone lines - which now stands at 77 percent in the applicants and 86 percent in the members. However, Verrue also reminded of the need to do away with obstacles that obstruct further progress in the applicants, among the most burning being the cost of

[31] Source: eEurope+ http://www.vus.sk/is/doc/eEurope%2Ben2001.pdf

services and computers. He also pointed to the great disparity in progress between the various applicant countries and even between different regions of one country - whereas an urban area may have 100 percent coverage with fixed lines, a rural area may only reach 30 to 40 percent.
Some aspects of the development of our two countries in this analysis were also stressed and described in more details in the Progress Report:
In the chapter of "Capabilities and Skills":
The Slovakian INFOVEK Project aims to provide Internet access to 2,500 primary and 800 secondary schools by the end of 2005. Almost 20% of the schools had been connected to the Internet at the end of 2001 and this proportion should increase to 35% by the end of 2002. In addition to the Internet connections teachers are being trained to use ICT and integrate it into the teaching and learning process using multimedia materials and digital content.

The Czech Republic is currently implementing the first period of information educational policy called 'Internet for Schools'. It aims to make infrastructure available for all schools by 2002, improve the access by 2003 and ensure that high quality training is available at primary and secondary schools by 2005. The objective of the project is to ensure a high quality ICT literacy for primary and secondary school leavers with support of improved infrastructure and software. In total, 6,200 schools should be put online in the framework of this 250 M Euro project by 2005.

As well as in the section "Research Networks":

CESNET (Czech National Research and Education Network), established in 1996 by all universities of the Czech Republic and the Czech Academy of Sciences, has recently upgraded the CESNET2 connection to the Internet from 155 Mbs to 622 Mbs. CESNET's main goals are operation and development of the Czech NREN, research and development of advanced network technologies and applications and increased public awareness about advanced networking matters.

The Slovakian academic network (SANET) has been substantially improved and the bandwidth of the backbone network has been upgraded from 4Mbps to 1 Gbps. All the major cities will be connected by the end of 2003. SANET provides access to Internet for all universities, research institutions, scientific libraries and some schools and museums.

Obstacles and problems

The Progress Report shows that the Information Society is already present in EU Candidate Countries, on the other hand there are still obstacles and problems, which can be summed up as follows:

- Fixed line networks are known to have substantial levels of faults per line (particularly where analogue switches, old loops, and shared lines are still used) and there is poor coverage in rural areas;
- Despite high penetration rates, it can not be assumed that the current generation of mobile networks are usable for access to Internet although the current upgrading technologies (e.g. GPRS) offer potential in anticipation of 3G services (UMTS);
- Cable TV availability has not yet been exploited at any scale for use to access Internet. This may be a policy issue that needs to be addressed;
- Alternative access technologies such as wireless local loop, DSL, and digital TV are not yet widely deployed, if at all;
- Both the costs of Internet access as well as the cost of purchasing a personal computer representing a significant portion of the net income appear to act as blocking factors in household penetration rates for Internet access;
- With a few exceptions, there is still a low penetration of computers in schools. In addition, there is substantial divergence between the countries for all three levels (primary, secondary, and tertiary). It seems that about half of the computers in the schools are connected to Internet, in some countries with a very high-speed connection via national research networks. Most of the countries have ambitious programmes that aim to connect schools and provide computer facilities;
- Public access points remain a very important means of Internet access for the population at large;
- Overall, it can be said that there are considerable divergences between the candidate countries in absolute terms. Some seemingly do better than many of the EU Member States, at least in the areas in which there is data, but many still have considerable catching-up to do.

Which way to go?

During the last few years, an important issue has been that of "materialising the political will". In other words, how to get from policy to practice? Policy driven development versus development driven policy? It is probable that a development driven policy may work better in the candidate countries as the implementation mechanisms are not yet operating at an optimal level and public administration reforms are still in process.

With many of the candidate countries currently experiencing the first, rather difficult results of the liberalisation of their telecommunications markets, attention now needs to be given to effective enforcement of the pro-competitive regulatory framework in order to bring prices down and

penetration up. Special attention will need to be given to the preparations for the implementation of the new EU regulatory package for communications services, recently adopted by Council and European Parliament.

Furthermore, important issues for the next phase of the *e*Europe+ action plan are: the completion of the implementation of the EU acquis relevant to the Information Society, in particular in relation to eCommerce as a pre-condition in creating trust and confidence in the use of Internet-based transactions; the introduction of alternative Internet access technologies; the provision of computers to schools and their connection to Internet, accompanied by appropriate curricula and training of teachers; increasing the number of public access points to ensure greater participation for all; and the further development of eGovernment services and of local content.

All these ideas are huge tasks for the Candidate Countries; they will go on in their clear and tangible commitment to progress the implementation of the Information Society. This commitments is more than ambitious considering the fact that they have focused on a common key date – 2003 – by which they aim to meet the *e*Europe+ targets and at the same time the EU Member States have already adopted a continuation of *e*Europe 2002 a new Action Plan *e*Europe 2005 which covers years 2003 – 2005 during the Seville European Council 21 and 22 June 2002 and this follow-up document was also already recognised in its core priorities at the above mentioned conference in Ljubljana in June of this year by all participating countries that means by Applicant Countries as well. (http://www.europa.eu.int/information_society/eeurope/news_library/documents/eeurope2005/eeurope2005_en.pdf)

Institutions and their LMSs

Ten Czech and four Slovak interviewees will from now on guide us through following pages. **Table 4** contains their basic data. According to the division stated on the first page there are 9 academic bodies (7 from the Czech Republic and 2 from Slovakia) and 5 so called other institutions (3 from the Czech Rep. and 2 from Slovakia).

Table 4. Institutions sorted by Country

Institution	URL of Institution	Country	Type of institution
University of Hradec Kralove, Faculty of Informatics and Management (UHK-FIM) Univerzita Hradec Králové, Fakulta informatiky a managementu	www.uhk.cz	Czech Republic	Public College
VSB - Technical University of Ostrava (VSB – TUO) Vysoká škola báňská-Technická univerzita Ostrava	www.cs.vsb.cz	Czech Republic	State University
The Faculty of Economics, VSB - Technical University of Ostrava (FE) Ekonomická fakulta, Vysoká škola báňská-Technická univerzita Ostrava	www.ekf.vsb.cz	Czech Republic	College - University
The University of Ostrava Ostravská univerzita	www.osu.cz	Czech Republic	University
The School of Business Administration in Karvina, the Silesian University in Opava (SBA in Karvina) Obchodně podnikatelská fakulta v Karviné, Slezská univerzita v Opavě	www.opf.slu.cz http://edu.opf.slu.cz	Czech Republic	Public College
The Faculty of Science, The University of Ostrava (FS-UO) Prirodovedecka fakulta, Ostravská univerzita	www.osu.cz	Czech Republic	University
Czech Technical University in Prague (CTU in Prague) České vysoké učení technické v Praze	www.cvut.cz	Czech Republic	Technical University
The Czech-Swiss Institute Česko-Švýcarský Institut	www.vkacsi.cz	Czech Republic	Independent Institution
The Czech Insurance Company p.l.c. Česká pojišťovna a.s.	www.cpoj.cz	Czech Republic	An Insurance Company Public limited company
Czech Telecom p.l.c. Český Telecom a.s.	www.ct.cz	Czech Republic	TELCO provider Public limited company
Academia Istropolitana Nova (AINova)	www.ainova.sk	Slovakia	Civic Association independent non-governmental institution
Local Centre of Distance Education at Slovak University of Technology in Bratislava (LCDE) Lokálne stredisko dištančného vzdelávania pri Slovenskej Technickej Univerzite Bratislava	http://hercules.kar.elf.stuba.sk/lsdv/	Slovakia	Educational Institution
TeleDom	www.teledom.sk	Slovakia	Educational e-learning centre
The University of Zilina Žilinská univerzita v Žiline	www.utc.sk	Slovakia	University

The Czech Republic

Slovakia

Following **table 5** is a summery of the most important quantitative data on use of LMSs by institutions. Among the 10 identified LMSs, only 3 (BlackBoard, Click2learn, LearningSpace) are listed as "other LMS". That means that currently they are not used as the main systems, they might have been applied in the past, or might be in use at the moment as secondary systems. Products by Macromedia and a toll Instructor (Click2learn) are not included in the study as LMSs. More transparent overview of LMSs is sated in the **table 6**. In the further analysis we will work only with the currently used systems.

We can see that we deal with three major groups of LMS systems. The first one is the system **Tutor2000**, which is in use by 5 institutions. The second group could be called **other standard LMS** comprising WebCT (2x), GLN, LearningSpace, Aspen, and Intralearn. The last one represents the **In house developed** systems used by three institutions.

The number of online courses does not vary significantly. The highest numbers are 30 courses and 40 modules.

The table shows bigger range in the number of online tutors (from 2 to 200) as well as in the number of online students (from 30 to 4005). For example, Tutor2000 is in use by all contacted institutions just for very short time yet. By all of them it is just their first year, in this respect the course length is not yet clearly specified. In spite of that there is quite a high number of students included in the courses already (up to 4005).

The column of number of years in use indicates the early start of e-learning application in the Candidate Countries. There are only 5 institutions that have more than 1 year of experience.

The typical course length is usually determined by the school terms at the universities, which is 14 weeks. By other institutions this figure varies from 20 hours to 6 months.

Table 6 shows the origins of the LMSs. There are 5 of American nationality currently used by 6 institutions. On the other hand there is one Czech system used by 5 respondents. 3 institutions have decided to develop their own system according to their requirements; they are Czech as well as Slovak origin.

Table 5. Data on use of LMSs by institutions sorted by LMS

Name of institution	LMS	Other LMSs used	# Online courses	# Online tutors	# Online students	# Years in use	Typical course length
VSB – TUO	GLN – Global Learning Network	None	The system is universal. At the moment there are about 8 courses provided.	2 per one course	no limitations, but approx. 80 students	2	6 months
Czech Telecom p.l.c.	Ingenium 6.1 = Aspen LMS today Click2learn	None	20	more than 10	15,000	2	3 days (FTF equivalent)
AINova	In house developed	None	1	12	30	0	6 months
Czech-Swiss Institute	In house developed	None	40 modules	20	Currently about 100 students	2-3	1 month
LCDE	In house developed	None	2	3+6+6	30+30+300	1	Arbitrary
TeleDom	Intralearn	BlackBoard	30	30	150	-	20 hours
FS-UO	LearningSpace	Click2Learn	30	20	100	5	One term (14 weeks)
Czech Insurance Company	Tutor2000	None	Currently approx. 25	Currently 6-10	4000	1	2 hours
FE	Tutor2000	None	-	200 teachers	4005	6 months	-
SBA in Karvina	- Tutor - Instructor	Only products by Macromedia (Director, Dreamweaver, Flash and Authorware)	6	8	400	Since September 2001	-
University of Ostrava	Tutor2000	Before LearningSpace	3 developed courses	2	50 that are signed and working, approx. 500 students	The first year	One term (14 weeks)
University of Zilina	Tutor2000	None	-	6	A licence for 1000 students	Probation operation for 5 months	It is not specified
CTU in Prague	WebCT	None	Not limited	Approx. 15	More than 300	2	Support for traditional courses, which last one term (14 weeks)
UHK-FIM	at the moment WebCT	Before LearningSpace (for 2.5 years)	8 at the moment, 15 in preparation	20	More than 500 (students in the courses)	1	One term (14 weeks)

Status: March – May 2002 (time period of conducting the interviews with the institutions)

The Czech Republic

Slovakia

Table 6. LMS systems sorted by original nationality

LMS systems	Original Nationality	Language of LMS	URL of LMS	Institutions currently using stated LMS as a main instrument	Institutions using other LMS
BlackBoard	American		www.blackboard.com		TeleDom
Click2learn Ingenium 6.1 = Aspen LMS today	American	English Czech	http://home.click2learn.com/en/aspen/aspen_lms.asp www.click2learn.com	Czech Telecom	FS-UO
GLN – Global Learning Network Cisco	American	English, German, French, Spanish, Hungarian, Japanese ...	http://cisco.netacad.net	VSB – TUO	
Intralearn	American	-	http://teledom.ibcnet.hu/ http://www.intralearn.com/	TeleDom	
LearningSpace (Lotus-IBM)	American	English	http://www.lotus.com/products/learnspace.nsf/wdocs/homepage http://domino.osu.cz/webpage2.nsf	FS – UO	UHK – FIM
WebCT	Canadian	English Czech	www.webct.com http://oliva.uhk.cz/webct/public/home.pl (of University of Hradec Kralove, FIM)	UHK – FIM / CTU in Prague	
In house developed Czech-Swiss Institute	Czech	Czech	-	Czech-Swiss Institute	
Tutor2000 (company Kontis)	Czech	Czech	www.kontis.cz www.e-learn.cz	FE/ University of Ostrava/ SBA in Karvina/ Czech Insurance Company / University of Zilina	
In house developed AINova	Slovak	English	http://www.flexeman.sk	AINova	
In house developed LCDE	Slovak	Slovak	http://hercules.kar.elf.stuba.sk/~targroup/snls/start/ http://hercules.kar.elf.stuba.sk/tar/projects http://hercules.kar.elf.stuba.sk/tar/ts/	LCDE	

Status: March – May 2002 (time period of conducting the interviews with the institutions)

Results from the interviews

There were seven main parts identified in the Web-edu project questionnaire:

1. ***Course development tools***
2. ***Student support tools***
3. ***Tutor support tools***
4. ***Administration***
5. ***Technology***
6. ***Price aspects***
7. ***Conclusion:***
   - ***a) Overall evaluation***
   - ***b) Features in future LMSs***

As already mentioned we deal with three major groups of LMS systems defined as:

- *Tutor2000* used by 5 from 14 institutions
- *Other standard LMSs*: WebCT (2x), GLN, LearningSpace, Aspen, Intralearn
- *In house developed systems* by three institutions

Each main part follows this classification. Considering the number and variety of systems in the second group, the description is done by means of tables and following indicators:

- (+)....."positive" impression
- (-) ....."negative" impression
- (+/-)..... "rather positive than negative" impression
- (-/+)..... "rather negative than positive" impression
- (?)....."overall"

The statements in these tables show the opinions of the interviewed institutions on the use of their specific LMS according to the single questions. The indicators then reflect the sum of these individual opinions. The indicators on the bottom of each table express the quality of the certain LMS according to the given statements. The indicators on the side of the table show the general impression of all 5 standard systems within the single question category. There are cases by description of WebCT that the column is divided into two statements. The reason is that there are two institutions using this LMS and the separation is always applied when their answers differ from each other. In other cases when they supplement each other or their impression is the same, it is placed in one square.
The indicators are not included in the table of price aspects because it is a quantitative description.

- ***Course development tools***

We were looking for answers on following questions:

- ***Course creation.*** How satisfactory was the LMS for course creation?
- ***Structure and didactic flexibility - openness.*** In the creation of course materials did the LMS permit didactic flexibility? Was the structure open to differing didactic possibilities?
- ***Teacher user friendliness.*** How easy was the LMS to use by teachers and course developers?
- ***Support for graphics, audio and video, moving image.*** Did the LMS support the provision of graphical materials, moving images, audio and video in the course content?
- ***Questioning, assessment, assignments.*** What provision was made by the LMS for student questioning and assessment and the design of student assignments?

Table 7. Software Tools Used for Course Creation

Software tool	URL
ToolBook Instructor (Click2learn)	http://home.click2learn.com/en/toolbook/index.asp
Macromedia	http://www.macromedia.com/
Flash	
Director	
Dreamweaver	
Authorware	

Tutor2000

By all institutions using Tutor2000 came the same answer saying and differentiating the course creation from the LMS, LMS does not influence the course creation. Tutor2000 is a management tool not a content creation tool. For these purposes they apply other tools as stated in the **Table 7**, mainly ToolBook II Instructor, which is viewed as fully satisfactory.

The system permits the didactic flexibility and the structure is open to different didactic elements like graphics, animation, simulation, video, audio and allows their interconnection.

Generally the work with the system requires some training and the co-operation with creators is needed.

Concerning questioning, assessment, assignment there were following reactions:

"All the tests (those generated automatically as well as those created manually) have the character of independent courses that means they are the same objects like usual courses within the LMS."

"Student self-control, student assessments, various forms of testing, giving assignments are possible."

A negative respond as well:

"Tutor2000 does not have its own questioning system. With the help of standard communication AICC the system can obtain results of the tests, which were created in ToolBook. These results then can be processed by the system. Unfortunately our installation of Tutor2000 shows considerable defects and so this function does not work reliably (at the moment not at all)."

Other standard LMSs

Table 8. Course development tools - Other standard LMSs

1. Course development tools							
	LearningSpace	WebCT		GLN	Intralearn	Aspen	?
1.1	Good for structure creation, worse with editing provisions(symbols, formulas), multimedia is not good, transfer of text not well solved	More or less satisfactory	Course materials developed outside LMS, implemented in format of HTML, XML, PDF	Course created in advance by LMS provider (Cisco Systems)	Easy usable Internet platform for creation of dynamic, interactive, measurable Internet products	No course development tools. It is "open" LMS.	- / +
1.2	More or less, general course overview, course tasks, time figures, overview of reached results are satisfactory	Quite open, enables to use various didactic elements	some tools are provided, but not possible to create another tool	No creation of materials needed	Material addition very flexible	Yes, but limits in multi level course structure – not available	+ / -
1.3	Not that easy, requalification needed	Quite easy after short training or with knowledge at least on level ECDL Start		Easy, intuitive use	Training needed	NO special tools for teacher	- / +
1.4	For single creation just few provisions, possible to implement from external medium but also with difficulties.	Yes, all of them, system is based on www Apache server – files through http protocol, no streaming, but possible to have a link to other server with any technology		Yes, all the forms	Yes, supported – file formats e.g. .wmv,.wav,.swf, .rm,.rpm,.asf, audio, video, flash, multimedia	AICC compatible. Graphics, moving images, audio, video all supported.	+ / -

LS	Testing is sufficient, database of questions, possible to set time parameters	Plenty of provisions: selftest, questions types- multiple choice, calculating ones, automated assessment of text; inquiry-anonymous answers on questions, submission of assignments for assessment	Integrated system for examining by means of www, central database of student results	Test assessed by teacher, self-assessment test from question types: multiple choice, answers yes or no, true or false, written essays; provision to set minimal exam requirement in %; results are registered in personal assessment student book, assignments for group or all covering/universal assignments	Questioning, assessment, assignments must be included in course. LMS stores results only.	+
?	-	+ / -	+	+	- / +	

Explanation: (?) overall, (-) negative impression, (+) positive impression, (-/+) rather negative than positive impression, (+/-) rather positive than negative impression, (--) information not provided,

In house developed systems

One of the positive points of the self-developed system is that the institutions are adjusting their LMS according to their needs and requirements. This refers to the course creation as well where certain features are constantly being updated in order to meet the needs of course developers. One respondent states:

"As we were developing the system on our own we were actually all the time learning from our mistakes. Each of the stage was applied in practice on a certain segment of users in order to improve immediately every step. Nowadays the system meets our needs and enables easy work for students and teachers. If it was not so, it would be impossible to have the system in operation, because our teachers are external specialists (mainly university teachers) and they would not accept complicated co-operation. They supply the courses with know-how (e.g. Maths, Management, Economics, Law, Accounting etc.) and our employee co-operate with the teacher as a scenarist. It means that we make the most of suggestions and corrections and after that the teacher judges the content correctness and efficiency."

In this sense after familiarisation with the system the use is not complicated in all three cases.

The question on structure and didactic flexibility brought 3 different answers as *"yes LMS permits didactic flexibility"*, *"A fixed structure of course support was given"* and *"the didactic flexibility is planned for the future"*.

Graphical material are usually an internal part of every course, alike audio and video, moving images are supported.

The LMSs provide a variety of options for questioning, assessment and assignments as self-testing questions, direct posting of questions to the tutors, posting of questions to other users (common discussion), direct

posting of administrative and technical questions, subject related FAQs, group assignments, tests according to the nature and character of a certain course, the assessment is an internal part of LMS, is made public, there is an automated submission of ready assignments.

- ***Student support tools***

We were looking for answers on following questions:

- ***Interactivity possibilities.*** What provision does the LMS make for student interaction?
- ***Online student to student communication (synchronous and asynchronous).*** What facilities does the LMS provide for student communication to other students and how successful is it? Is both synchronous and asynchronous communication between students supported?
- ***Online student to tutor/institution communication (synchronous and asynchronous).*** What facilities does the LMS provide for student communication to the tutor ion to the institution's administration and how successful is it? Is both synchronous and asynchronous communication supported? Are these support services available 24 hours a day?
- ***Resources, library, references.*** What facilities does the LMS provide for student acquisition of resources required by the course, especially library resources and references to required readings?
- ***Feedback on work and assignments.*** What is the quality of provision of feedback to students on their work and assignments?

3 TUTOR2000

The interconnection among the students as well as communication as such is not directly available within the system, it is necessary to use external facilities. It was said that this absence of student to student/student to tutor, institution (synchronous and asynchronous) communication should have been removed in a short time. (As we have received the latest news, it has been arranged already). Nevertheless interviewees used to apply and are used to applying communications tools / software in Intranet or Internet such as NetMeeting, MSN Messenger, e-mail. These services are available 24 hours a day.

Here is one comment:

"About the asynchronous communication it is said by the authors, that it is fully supported by Tutor2000. The truth is that it is necessary to install News server for the asynchronous communication. After this installation Tutor2000 is able to create discussion groups on various topics (normally on the topic of the course)."

Resources, library, references, important readings are normally accessible through www links to the specific pages as to the University library or to the websites of University departments or internal materials of the company as well as a system of internal regulations/directives is used.

With regard to feedback on work and assignments the teachers might use the e-mail, the News, synchronous communication or classical telephone contact.

Other standard LMSs

Table 9. Student support tools - Other standard LMSs

2. Student support tools						
	LearningSpace	WebCT	GLN	Intralearn	Aspen	?
2.1	Virtual classrooms (discussions on certain topics) for students and teachers as well	e-mail, group discussions, chat	Interactive "E-lab" tool based on Flash technology, works as simple simulator of computer network laboratory	e-mail, chat, remarks addition into discussion group	Forums, results review	+
2.2	Only asynchronous communication	- asynchronous communication – e-mail, discussion group - synchronous comm. – chat, graphic tables	Only asynchronous communication	Yes, both: e-mail, chat, remarks addition into discussion group	Forums, No synchronous features are available and required	+ / -
2.3	Asynchronous for 24 hours a day: 2 forms: 1.virtual classroom, 2. Student placing of assignments (can be private-student/teacher or public)	- asynchronous communication – e-mail, discussion group - synchronous comm. – chat, graphic tables; teacher present 1 hour a day	Not available	Same as 2.2, each student has e-mail account in his profile; synchronous com. – chat only during consultations time; asynchronous com. 24 hours a day	Forums, No synchronous features are available and required	+ / -
2.4	MediaCenter (distribution of all electronic resources) is internal part of system, links to websites	Various materials can be incorporated in form of www sites, ppt presentations	Only www links	Web links, references	Resources included in course, No special tools for resource library management	+ / -
2.5	Very good feedback system. adjustment of tasks status as `in development` `sent for comments` `sent for assessment`. Solutions to be private/public	Autotest- immediate feedback; results not registered; assignments-student get back number of points, and a written comment by teacher	Student can look at the test results and correct answers of test questions	Students results in overall overview of results, solvable assignments to be sent as attachment, submission deadline for assignments can be put in students calendar	On-line result reports / self tests for students	+
?	+	+	- / +	+	+ / -	

Explanation: (?) overall, (-) negative impression, (+) positive impression, (-/+) rather negative than positive impression, (+/-) rather positive than negative impression, (--) information not provided

In house developed systems

Among interactive possibilities, following provisions were mentioned: group assignments, common discussions, instant messaging.

Both synchronous and asynchronous communication in forms of chat, discussion groups, e-mail was already available during the time of conducting the interviews or being prepared to be ready in a short time. Since the server is usually on all the time, the asynchronous and the synchronous communication is available also 24 hours a day. By one respondent the synchronous communication is available 10-hour day. In one case the connection between student and tutor is provided so far only on asynchronous basis.

Required readings are available online, the lecturer has the possibility to make his lectures' materials public in the form of PDF documents on the web or to put links to other websites. Students have always access to the libraries of participating institutions.

Concerning feedback on work and assignments in one case the feedback on self-testing questions is pre-programmed. Other LMS allows to add a written comment to the assessment in points.

- ***Tutor support tools***

We were looking for answers on following questions:

- ***Tracking students – database questions.*** How user friendly is the LMS for tutors wishing to track their group(s) of students and retrieve data from the student database?
- ***Group management tools.*** What facilities are provided by the LMS to the tutors for managing their group(s) of students?
- ***Preparation of questions and assignments by tutor.*** How successful is the LMS in providing tutors with user friendly and didactically successful tools for the design of student questions and assignments?
- ***Course planning for students (monitoring pace).*** What tools are provided by the LMS to tutors to enable them to monitor and plan student progress?
- ***User-friendly administrative systems between tutor and institution.*** What provision does the LMS make for successful tutor to institution communication?

The functionality of tracking the students and management facilities for the tutor seems to work well and users have positive experience with that. The LMS enables the teacher to see his subjects, students, who are attending his course as well as all materials that are linked/needed for these courses of this teacher. The LMS makes notes of all interactions of the student with the electronic course, that means there is a complete study protocol available and the tutor has overview about all student activities. The teacher can follow the students progress, make conditions allowing them to continue in the studies after successful passing the tests. And again the teacher has the possibility to use the NetMeeting, News (discussion groups), e-mail, text news in order to communicate with the institution. One of the institutions was just solving the link/connection to their school information system and the other one was preparing a planning calendar.

Some criticism:

"The authors say, that Tutor2000 allows complete overview about student's progress in the study, about his activities and reached tests results. The truth is that the system has these possibilities, but in our installation some of the things do not function correctly."

Here is another perspective of the teacher described as:

"The current version of the system does not provide any support tools for teachers - the position of the teacher does not exist in our company. There are only people who guarantee for the content of the electronic courses and these are employees of expert departments. The whole management and organisation of the study is governed by the education department."

Other standard LMSs

Table 10. Tutor support tools - Other standard LMSs

3. Tutor support tools						
	LearningSpace	WebCT	GLN	Intralearn	Aspen	?
3.1	Good, student contributions easy accessible, sorted according to topic, students, dates...	By smaller number of students is good single server version; by bigger number is better Campus version, where link to external databases is built in. Possible to be linked to student database.	Tests results are accessible by the teacher	Work/ communicate with group; select tasks, assignments; control student's procedure & progress	LMS follows start date, end date, total time spent in course, self test results review	+
3.2	Group defined at beginning, after their virtual classroom is created, where	Discussions, advanced statistics evaluate student work, access to study materials is	Opening the tests, to follow the statistics, cancellation of unsuccessful tests	Tools for management of groups – group tasks, chat, discussion forum	Forum, mail	+

	student profiles, portfolio are in.	monitored				
3.3	Tasks organised by/in special modules	Developed out of LMS	Assignments are prepared in advanced by system provider	Advanced system for self-assessment tests creation, patterns for working out of assignments	Testes/ questions must be designed in courses, LMS saves, summarises results	+ / -
3.4	Course structure can be displayed in schedule or calendar with student duties, activities-time unlimited, time-limited, fulfilled in time interval	Syllabus, calendar, assessment, assignments, possible to adjust accessibility to single course elements, time monitoring of websites access	Student progress is determined by chapters, for which there are tests opened	Possible to limit student's access for specific time, follow his progress in course within that specific time period, put tasks dates into the student's calendar	LMS follows start date, end date, total time spent in course, self test results review	+
3.5	Only in way of discussion contributions on tutor, no external communication out of course	None, Single-server version has no external line-up	Management of course is directly done by teacher, whole interaction with LMS works through www interface	In the form of e-mail, face to face meetings	No tools	- / +
?	+	+ / -	+	+	+ / -	

Explanation: (?) overall, (-) negative impression, (+) positive impression, (-/+) rather negative than positive impression, (+/-) rather positive than negative impression, (--) information not provided

In house developed systems

Replies within this section showed global satisfaction, where e.g. one LMS provides list of all students (not yet with a search functionality, but planned to the future), enables the tutors to view all users´activities undertaken online, statistics of all users (movement through the course, self-testing questions opened and answered, communication).

Design of student questions and assignments is supported and considered as successful, simplifying the teacher's work in the following way:

"The system provides templates for preparing the course materials where the self-testing questions are an integral part. The same applies to the tests and the assignments which are than uploaded to the system."

And at the same time tutor communicates with the institution as described:

"LMS allows for direct online communication between tutor and institution, instant messaging, mailbox reminder, communication history."

- ***Administration***

We were looking for answers on following questions:

- ***Enrolment procedures and fee paying.*** What facilities does the LMS provide for student enrolments, course allocations and payment of fees?

- ***Passwords and security.*** How successfully does the LMS handle student access to the system and the security of all student interactions with the system?
- ***Student records database.*** How successful is the system's student database, especially for data storage and data retrieval.
- ***Examination and certification records.*** What structures are provided for recording of data and results leading to examination and certification?
- ***Course, class and tutors database.*** What facilities are provided for administration of courses, classes and tutors?

5 TUTOR2000

The student registration is done by administrator directly in the system. The course is allocated also directly by means of the system and this is done either by the administrator again or by a teacher, if he has the right to do so. One of the interviewees stated that they were just preparing an interconnection between the LMS and a database "Student", where students can sign in obligatory and optional courses/subjects.

The password and security issue has invoked quite negative reactions as e.g.:

"I am not that satisfied with passwords and security. It has happened to me more times already, that after correct sign out, I could sign in without system's request for my password. By the sign – in the system has a option "to save the password" and by the use of the same PC by more students (and by their carelessness) it can happen, that the next student can get into the account of the previous student. The system does not have protected courses (they are launched / opened in the new window and their address can be obtained in more ways)."

On the question of student record database Tutor2000 was considered as having a disadvantage that student can change all their data in the system as name, surname, address, date of birth..., what can cause chaos in the database.

By larger companies it is usually the case that an Accounting system (AS) already exists by the time of implementation of e-learning systems. It might be e.g. SAP, which covers all finance, controlling, human resources... of the firm. That means that LMS is coming as a separate, independent tool and is usually implemented parallel to the Accounting system. So far, the integration between the LMS and AS systems does not seem to attract much attention. This same finding appears in a comparative study on *Online Education Systems in Scandinavian and Australian Universities* written by Morten Flate Paulsen (http://www.nettskolen.com/in_english/webedusite/) where the author develops this idea further "One may however predict that this integration will be more and more important as online education generates more income for the institutions."

By the Czech Insurance Company it is the case that in order not to duplicate databases, the data about the students and their course attendance are transferred into the SAP and Tutor2000 is really only a connection of LMS and Student database in other words LMS and Students Management System.

Other databases as for courses, classes or tutor administration are not in use by any of the respondents.

The question `What structures are provided for recording of data and results leading to examination and certification?' brought the explanation that the system notes different statistics as:

- Activities of group of users: Number of allocated courses, finished successfully, finished without success, not finished, not started at all
- Activities of the user: Name of the chapter, status (started, not started), max. score, required score,...
- Activities of the users according to the categories (subjects)...

Other standard LMSs

Table 11. Administration – Other standard LMSs

4. Administration							
	LearningSpace	WebCT		GLN	Intralearn	Aspen	?
4.1	LMS linked to IS of Uni., there is complete student agenda. Payment system not available	No tools for economic agenda; student course allocation, student enrolment done by system administrator or teacher or student		www interface	Each course has stated price, students can register into course, payment done externally, not through LMS	All needed processes & tools- Course selection, enrolment, approving, fee calculation, fee allocation	+ / -
4.2	After course enrolment student account is installed, teacher places students into courses	User name, passwords		Use of HTTPS protocol	Unique log in name and password according to code after payment, this information is sent by e-mail, owner can modify this data	Log name & password	+
4.3	satisfactory	Not good	Our single-server version uses internal database-possible to make file backup, updates, but no data corrections by external programme; Campus version enables to connect data on outside SQL database	Easy, powerful, intuitive, no problem	Student database, all related data can be ex-/imported, archived	No problem, a large and stabile database structure	+ / -
4.4	Result portfolio from tests, assignments	Not good	Number of reached test points; time, when task was finished; comments of teachers	--	Records of results contain currently attended courses, number of taken tests/ exams, their results, number of reached certificates of student	Very good data structure- Students + skill + position description + by course delivered competencies data structures	+ / -
4.5	Not solved by LMS	--	Administration of teachers´ accounts is common with students´ accounts administration	--	It is responsibility of system manager, he defines teachers, allocates courses	On-line & FTF courses manageable by LMS, courses and curricula tools	- / +
?	+/-	- / +		+/-	+	+	

Explanation: (?) overall, (-) negative impression, (+) positive impression, (-/+) rather negative than positive impression, (+/-) rather positive than negative impression, (--) information not provided

In house developed systems

By our 3 questioned individuals 3 different answers came out on the issue of enrolment procedures and fee paying. One applies classical bank account transfer that means it is not governed by LMS. By AINova the payment of fees is just planned to be incorporated into the system. But this system enables already the learners to enrol online, the course material can be accessed online, downloaded or printed.

Each student obtains his password allowing to access only certain parts of the materials depending on student enrolment, time, group work...

Work with the system's student database was qualified as successful, or in other words as not having significant problem and always available also to the students.

Examination records are normally stored in so-called learners account or in a database, which is an internal part of the system. The final score from the assessment is a base for an exam.

There is usually a whole database for courses, classes and tutors posted online.

- ***Technology***

We were looking for answers on following questions:

- ***Server - hardware and software options.*** What is the quality of server hardware and software options? How is the system integrated with existing software?
- ***Client - hardware and software options.*** What is the quality of client hardware and software options? Does the system permit metatagging?
- ***Flexibility of didactic structure; updating, adaptability.*** Is the didactic structure flexible or is it determined by the technology? How adaptable is the technology to updates and to new technology that becomes available to the market?
- ***Limitation of size (number of students, courses, tutors).*** How satisfactory is the LMS for handling varying numbers of students, courses, tutors? How does it cope with 100, 1000, or 10000 students and large course databases?
- ***Speed of system.*** How is the speed of the system and student satisfaction? How does it cope with downloading courses and high bandwidth materials?

Tutor2000

The typical answers were:

"The system is integrated into MS Windows 2000, server of the firm Dell, CPU 1GHz."

" The system is installed in the Intranet on the server of the company (web-farm, load balancing), the database is on SQL cluster. The whole system is accessible in the Intranet (HTML and ASP technology)."

The usual requirements on the client's workstation were described as follows a standard PC (min. Pentium 200MHz, 32MB RAM), Internet Explorer min. 5.5 SP2, Microsoft Virtual Machine, MS Windows 2000.

The didactic structure is very flexible, the system is easy to be updated and at the same time it is possible to implement also new technologies into the system. The speed of the system is on the standard level so-called normal display speed of HTML sites, but as it was stated the speed always depends on the technical equipment of the client and on the Intranet / Internet lines, which are sometimes very slow.
Considering the limitations of size (number of students, courses, tutors) there came always the same kind of reply in the sense:
"There is no difference between 100 or 1000 users, it is given by the quality of the hardware devices. This counts also for the course databases. The limits are given by the size of the disk space and by the functionality of the SQL database."

Other standard LMSs

Table 12. Technology - Other standard LMSs

5. Technology							
	LearningSpace	WebCT		GLN	Intralearn	Aspen	?
5.1	Old software/ hardware	Not high requirements, no integration problems	LMS based on WWW Apache server on platform WinNT or Linux, possible to install ordinary modules into server	Server operated by Cisco Systems	Server with-processor 1GHz, 512 MB RAM, 40 GB Hard disk; software – Server NT 2000, MS SQL database	For Microsoft NT/SQL or Unix/Oracle platform	+ / -
5.2	--	Usual hardware, www browser, Java scripts support, Internet link		www browser with Flash Player pug in	Client needs- MS Windows 95, Macintosh, IE 5.0, NC 4.75; LMS permits metatagging	No special requirements, only Web browser	[32]
5.3	Bad	LMS provides fixed group of tools, their use in course is flexible		Structure separated from technology, course materials in one form	Allows updating, downloading of needed software, is created by modern technology – MS SQL databases	No relation between LMS and didactic structure	+ / -
5.4	Problems by massive application	No problem until now		Without capacity problems	No problems	No limits	+ / -
5.5	Not problem on LMS side	Fast access to sites	LMS works on standard www Apache server – the most widespread of all	Technical core in US is powerful, limited only by Internet lines	Platform allocated on institution's server - fast, limited only by Internet lines	No problem with LMS speed, dependent on communication infrastructure	+
?	-	+		+	+	+	

Explanation: (?) overall, (-) negative impression, (+) positive impression, (-/+) rather negative than positive impression, (+/-) rather positive than negative impression, (--) information not provided

In house developed systems

The quality of server – hardware and software was considered as good and the integration into the existing software was just planned by one

[32] The question number 5.2 is not assessed because the institutions stated factual data.

higher. No other software requirements are necessary for the client. Metatagging is supported.

Concerning flexibility of didactic structure; updating, adaptability the LMSs are considered as having no problem other is planning it for the future and the third interviewee states:

"The system has been built with the target of flexibility of didactic structure and that has been reached."

Looking at the numbers of students by all three is this number quite low and maybe therefore no problems have occurred until now although they might be working already on a limited number. One remarked directly:

"The system is not adapted for a large number of students yet, its maximum capacity is 100 students."

The speed of the system was defined as satisfactory always determined by the line speed of the institution.

- ***Price aspects***

We were looking for answers on following questions:

- ***Cost of the LMS (Learning Management System).*** What is the cost of the LMS to the institution?
- ***Annual fee.*** What fees have to be paid annually for the system by the institution?
- ***Student Enrolment fee (100 students, 1000 students, 10000 students).*** How do fees to use the LMS vary when the student base is 100 students, 1000 students, 10000 students? Is online invoicing available?
- ***Maintenance costs: staff involved in management, IT specialists, trainers, etc.*** What is the maintenance course to the institution of the LMS and what staff resources are need to maintain it and keep it functioning?
- ***Training of teachers and learners and system users.*** What costs are involved in staff and student training to use the LMS system?

The figures in following tables are sometimes stated in three different currencies. The reason is that institutions usually provided this information in their national currency. These figures were then converted into Euro and USD. In cases when the information was given directly either in Euro or USD, it remained the same and was not calculated further.

Tutor2000

Three from our Tutor2000 users have provided us with the price/cost information, which could be structured as follows:

Table 13. Price aspects – Tutor2000

Costs / Type of expense, fee		Value
Total costs: *payment to Telecom, expenses for servers, workstations, network, workers etc.*		3 Million CZK / 98 620 [33] / 96 855 USD[34]
LMS in configuration of 50 tutors and 1000 students		6969 USD, ToolBook II included
Annual fee		0, no fee for already bought system, considered as great advantage
Fees dependent on student base (100, 1000, 10 000 students)		There exist amount discounts for the student licenses: up to 50 students – 500CZK/16€ [10]/16 USD[11] /license, up to 500 students – 200 CZK/6.6€ [10]/6.5 USD[11]/license, for more than 10,000 students – 80 CZK 2.6 €[10]/2.6 USD[11]/license.
Maintenance costs - for customer's adjustment		34 USD / hour
Training	Annually	20 000 CZK/657.5 €[10]/646 USD[11] per teacher
	Charge for an hour by the firm	34 USD / hour
	One day training for 20 teachers by the firm	30 000 CZK/986 €[10]/968.5 USD[11]

Normally the institutions cannot afford such expensive services therefore the run of the system is secured by employees of the faculty within their normal working tasks and so there are no further costs required or other university employs 5 specialists full time. One is specialised in the LMS Tutor 2000, the second one is responsible for the work and training for ToolBook II Instructor, the others prepare patterns for the single courses, the teachers can choose then. All 5 of them have passed the distance course for distance education.

In the same way the expenses on training are being saved: *"The first one-day training was provided for teachers by the firm. The following trainings are run by the requalified employees from our Centre for information technologies within their regular working time/content."*

[33] Counted with the Czech/Slovak National Bank exchange rate from the 29th July, 2002; 1€ = 30.42 CZK/44.545 SKK. Source: Czech National Bank - www.cnb.cz/en/index.html, Slovak National Bank – www.nbs.sk/INDEXA.HTM

[34] Counted with the Czech/Slovak National Bank exchange rate from the 29th July, 2002; 1USD = 30.974 CZK/44.543 SKK. Source: Czech National Bank - www.cnb.cz/en/index.html, Slovak National Bank – www.nbs.sk/INDEXA.HTM

Other standard LMSs

Table 14. Price aspects – Other standard LMSs

6. Price aspects						
	LearningSpace	WebCT		GLN	Intralearn	Aspen
Cost of LMS	Fees for hardware and LMS administration, LMS was obtained from education support	Unlimited licence approx. 5,000 USD		LMS given for free to Local Academy of Education for Programme of Cisco Networking Academy	--	--
Annual fee	Free of charge	5,000 USD for year 2002, expected increase to 7,000 USD		No fee	--	--
Student enrolment fee	Grant per student from state	Fixed amount (5,000USD) for server licence is not dependent on number of students		No fee	--	--
Maintenance costs	One technician One administrator Personnel for IS Student	A system administrator, a specialist for teacher training for course creation, both employed part time	Approx. 100,000 CZK/3287 €[10]/3228.5 USD[11] per year	LMS is updated centrally by firm Cisco Systems	Internal, external workers; 50,000 -60,000SKK/ 1122-1347 €[10] / 1122-1347 USD[11] + costs for teachers	--
Training	Each teacher goes through 2 trainings:1. Tutor of distance education, 2. Operation with LMS	For teachers - preparation for ECDL (approx. 3500CZK/ 115 €[10]/113 USD[11]) + ECDL certificate (2500CZK/82 €[10]/81 USD[11]) + WebCT training (approx. 2500CZK/82 €[10]/81 USD[11]) x number of teachers (approx. 35). For students - a guide has been created + training within the seminars/classes	--	System is intuitive, only 40 min. training needed	Training of teachers, students receive guidebook about system operation in electronic form, a hotline is at disposal	--

Explanation: (--) information not provided

In house developed systems

All respondents gave us their financial information.

Table 15. Price aspects – In house developed systems

Costs / Type of expense, fee	Value / Cost for...
Cost of LMS	Development cost – app. 6,000 €
	0 – LMS was developed within a students project
	Investment of 1.1 Million CZK/36160 €[10]/35514 USD[11]
Annual fee	None-since LMSs are their systems
	only annual maintenance costs for servers, fees etc. about 300,000 CZK / 9862 €[10]/9686 USD[11]
Maintenance costs - staff	For 1 programmer and 1 supervisor

	"From the financial reasons we can allow us to employ just a few workers (currently 2) therefore the further development stagnates at the moment. The number is not satisfactory; an enormous personal engagement is required. Selected activities are accomplished by external specialists."
	1 person in charge of server run, more people co-operate on permanent development
Training	Cost for 1-day meeting

Online invoicing was available in one case, but not used.

o *Conclusion*

In this last part respondents were asked firstly to give their overall assessment of their satisfaction with LMS and secondly to specify features they would like to see included in the LMS in the future.

a) Overall evaluation

Tutor2000

Three reactions expressed their full satisfaction with the system as one completely functional and perspectival, emphasising the advantage that the whole operation of the system is in Czech language. On the contrary there were 2 critical comments. One pointing on some system shortages in comparison to the LearningSpace used before and the other stressing markedly:

"The system Tutor2000 is a LMS, which is mainly for administration agenda. Because of the fact that Tutor2000 cannot create courses, there is the ToolBook II as a component part of the delivery. From my point of view the system has some problems by single installations by customers. In our case some functions are not working properly (statistical evaluation / assessment). The system does not have an authorised access into the courses (they are opened in a new window and it is possible to obtain the address of the course). The system does not have its own means / tools for online communication. Considering these all facts I do not think that this system in this phase is appropriate for commercial use."

Other standard LMSs

Institutions very openly judged their systems. The shortages were criticised and the advantages considered.

Of the WebCT users one stated *"applicable"* the other *"it fulfils our requirements"*.

Aspen was characterised as *"well done for internal education of large company, where asynchronous and self-study methods are preferred"*. Positives are to be found also in the view on GLN: *"the LMS is good, its*

interface for study as well as for administration is completely based on www, it is world-wide and stable".

The look on LearningSpace gives us more details:

" For the current operation of the system in our education (approx. 100 students, 20 teachers) the system is usable. By higher numbers I do predict some problems. The system has quite satisfactory tools for the management of the education, it is worse with the tools for course creation. There is number of problems. The database administration would be very demanding and ineffective by higher number of students. The system does not solve the problem of relation/connection between a student and an education institution at all. The whole communication is just focused on the course. The communication e.g. with the study department and the whole study agenda is led/solved in the IS Student. The link between IS Student and LearningSpace is not automated."

Intralearn was judged as *"a modern platform, constantly improving according to the requests of middle (firms and educational centres) and commercial users (clients, students). By course creation the system allows to accept also older, earlier developed materials in different formats. There is no special courseware, which would cost a lot of money and also from the user's point of view it is very practical. It is not limited by any special requirements on hardware and software from final users. Administration and the management have not yet been completely tested in our conditions, but we can base on references of foreign firms (as well as universities), which use the system."*

In house developed systems

The LMSs were identified by all as good, meeting their needs and easy to use. They state that by the means of LMS the teacher's work is getting more structured and organised. One admitted the current size limitation what makes the system capable to offer courses just to a smaller number of learners and for the system's marketability this is also one of the features to be improved in the future.

b) Features in future LMSs

Tutor2000

- The possibility to apply more demanding technologies (Streaming video, videoconferences etc.)
- To guarantee an authorised access into courses and to secure a reliable operation of the system, protected communication in all ways
- Integration of more possibilities for online communication (chat, video, sharing, voice communication)
- A planning calendar
- More provisions for incorporation of more formats not only HTML, PPT etc.

Other standard LMSs

- LearningSpace:
  - Support for creation of education multimedia materials
  - Better import from other recourses / environments
  - Synchronous communication
  - Study agenda to be directly included as a internal part of LMS or automated link with IS Student
  - More attentive environment as for the student, as well as for the teacher
  - Czech localisation
  - The possibility of enrolment and fee payment to be within the system
- WebCT:
  - Better support for team work
  - Technology for streaming
  - A connection to external databases also from single-server version of the system
- GLN:
  - The possibility to integrate self-developed materials of the institution as separate additional materials to the official ones (by GLN, Cisco prepares and delivers study materials as well as the entire course in advance already)
  - Possibility to link own student database to central student database
- Intralearn:
  - More advanced assessment system of reports linked to statistics
  - Functional improvement of dictionary of terms
- Aspen:
  - Tools for vertical structured courses management (courses with more levels of modules, chapters and sections)

In house developed systems

- Better user support, better multimedia support
- Interconnection of all created modules of the system

Key findings

- The trust in e-learning is not yet wide spread. General public opinion about online education is not always positive. The institutions are many times viewed as the ones implementing strange "things". In most cases online education is used as a help and addition to the traditional face-to-face education. However there are individual experiments and, as one institution stated, they would like to adjust

their LMS in the way that it enables them to offer paid courses as a kind of lifelong education to the public.

- The institutions are facing significant financial problems, are afraid of announced charge increases of the LMS. The system development stagnates because of this lack. Faster implementation of the *e*Europe+ targets might have been reached if this implementation would not be largely coming from national budgets in the candidate countries.

- In the Czech republic recently a nice co-operation in a project of building a virtual university has started among 3 universities (SBA in Karvina, University of Ostrava and FE).

- 9 from 14 interviewed institutions have not been using LMS longer then one year. That shows the very early start but the results after such a short time are already visible. The acceleration of this development must be considered.

- Institutions are slowly converting to the national LMS vendors, since the systems are in their mother tongue and want to be active in larger market and offer services to the general public.

- There were cases in the study, where a kind of facility of a system was not available (e.g. synchronous communication). It must be considered that the institutions are choosing their system and its functionalities according to their future planned activities and requirements. That means that in spite of the fact that the system seems to have a shortage it is actually not the case, because the system in that specific form is the most suitable and fully satisfactory for the institution.

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Stand Ready?

Emerging e-learning standards in a pedagogical perspective.

By Gro-Anett Olsen

Even though the e-learning industry is a young one, it is said to be in need of common standards to ensure further growth. Today half a dozen organisations are working to create standards for the industry, and their main goal is to make the e-learning technology more flexible and user friendly. The standardisation issues have been given tremendous attention the last two years, and there exists quite a lot of optimism of standards impact on the future of e-learning.

As with all kinds of standardisation work, you have to let go of something. In order to reach the goal of flexibility, you must let go of the different variations that exist. So what must be "sacrificed" when standards get implemented? This article will look at why we need standards, and raise questions of possible consequences that today's upcoming standards could have in a pedagogical perspective if variation gets limited.

Key specification players

"To describe the e-learning standard arena as confusing and arcane would be an understatement (...)" Barron (2000:2).

Standards for e-learning is not an easy field to understand, and you could hardly say that there is common consensus about standards today. Further, it is important to be aware that we actually don't have any standards for e-learning today. Instead there are organisations with common interests and arguments that develop specifications for e-learning (Singh 2000). Examples of such organisations are IMS, AICC, ADLNet, IEEE, CLEO, WC3, ISTO. The first four are the most prominent today. Lets have a short look at how they describe their interests.

IMS – Instructional Management Systems Project

(http://www.imsproject.org)

IMS Global Learning Consortium, Inc. (IMS) is developing and promoting open specifications for facilitating online distributed learning activities such as locating and using educational content, tracking learner progress, reporting learner performance, and exchanging student records between administrative systems.

IMS has two key goals:

- Defining the technical specifications for interoperability of applications and services in distributed learning, and
- Supporting the incorporation of the IMS specifications into products and services worldwide. IMS endeavours to promote the widespread adoption of specifications that will allow distributed learning

environments and content from multiple authors to work together (in technical parlance, "interoperate").

AICC – Aviation Industry CBT Committe (http://www.aicc.org)

The Aviation Industry CBT (Computer-Based Training) Committee (AICC) is an international association of technology-based training professionals. The AICC develops guidelines for the aviation industry in the development, delivery, and evaluation of CBT and related training technologies. The objectives of the AICC are as follows:

- Assist aeroplane operators in development of guidelines, which promote the economic and effective implementation of computer-based training (CBT).
- Develop guidelines to enable interoperability.
- Provide an open forum for the discussion of CBT (and other) training technologies.

ADLNet – Advanced Distributed Learning Initiative

Shareable Courseware Object Reference Model (SCORM)
(http://www.adlnet.org)

The US Department of Defense and the White House Office of Science and Technology Policy launched the Avanced Distributed Learning Initiative in 1997. The purpose of the ADL initiative is to ensure access to high-quality education and training materials that can be tailored to individual learner needs and made available whenever and wherever they are required.

ADL released SCORM (sharable content object reference model). SCORM is designed to meet the US Department of Defense's requirements for web-based learning content, supporting content reusability, accessibility, durability and interoperability.

SCORM gives specifications for representing course structures (in order to move courses from one server/LMS to another), specifications relating to the run-time environment, a content launch specification and a specification for creating meta-data records for courses, content and raw media elements.

IEEE - Institute of Electrical and Electronics Engineers
LTSC: Learning Technology Standards Committee

(http://www.ltsc.ieee.org)

The mission of IEEE LTSC working groups is to develop technical Standards, Recommended Practices, and Guides for software components, tools, technologies and design methods that facilitate the development, deployment, maintenance and interoperation of computer implementations of education and training components and systems. LTSC has been chartered by the IEEE Computer Society Standards Activity Board. Many of the standards developed by LTSC will be

advanced as international standards by ISO/IEC JTC1/SC36 – Information Technology for Learning, Education, and Training.

IEEE cover topics including learning object metadata, student profiles, course sequencing, computer managed instruction, competency definitions, localization, and content packaging.

Technological standards for e-learning. Why?

"E-learning standards are the vehicle that will bring flexibility to content and infrastructure solutions" (Singh 2000:1).

Standards for e-learning will give us new and improved ways of training and education in both an individual and organisational perspective (Wagner 2000). An important aspect of e-learning is that it depends upon technology for implementation. New and improved information technologies like databases, learning management systems (LMS), learning content management systems (LCMS), search engines etc. are giving new possibilities for storing, retrieving and reusing information objects across systems, time and geography.
The standardisation initiatives focus on how to make e-learning even more flexible, through making the different new technologies more compatible with each other.

Even if different standardisation initiatives focus on different issues for standardisation, there is a common opinion about content portability, granularity and interoperability. In Singh's White Paper *"Demystifying eLearning Standards"* he explains these as:

> **"Content portability** - When content has been separated from proprietary delivery systems, the organization can consolidate, organize and track their eLearning initiatives in the LMS of their choice. Because this is true for both third-party custom content, corporations will have greater flexibility and lower switching costs.
> **Granularity** - The new specifications supports the learning object methodology, allowing for smaller and more timely units of information. Learning objects adds "just enough" to "just-in-time" learning.
> **Interoperability** - Application interoperability starts where different eLearning applications can share content and tracking data. But even more exciting, these specifications open up the possibility for different types of applications to swap and access content." (Singh 2000:4).

For the young e-learning industry to develop further, industry standards that ensure this kind of flexibility must be developed, established and accepted.

Effective learning solutions: LMS, e-learning and standards

The initiative for establishing standards comes mainly from specific needs within large organisations/enterprises that have tradition for using technology in learning/training, and that need effective learning solutions to meet their challenges. These organisations handles a large amount of training to a large number of employees, and they need to do it as efficient and manageable as possible.

The US Department for Defense and the aviation industry has taken the initiative in two of the most prominent standardisation workings today: SCORM and AICC. These organisations have a vision of using new technology to make learning and training more effective and tailored, both for the individual and the organisation. Further, they wish to stimulate the market in order to increase variation and quality in training and educational offerings. ADL writes this about the SCORM initiative:

> "The Department of Defense (DoD) and the White House Office of Science and Technology Policy (OSTP) launched the Advanced Distributed Learning (ADL) initiative in November 1997. The purpose of the ADL initiative is to ensure access to high-quality education, training and decision aiding ("mentoring") materials that can be tailored to individual learner needs and made available whenever and wherever they are required.
>
> This initiative is designed to accelerate large-scale development of dynamic and cost-effective learning software and to stimulate a vigorous market for these products in order to meet the education and training needs of defense and industry in the 21st century. ADL is developing a common technical framework for computer and Web-based learning that will foster the creation of reusable learning content as "instructional objects." (ADL 2001: 1-11).

An important part of the standardisation initiatives for e-learning are learning management systems (LMS). This is essential for an e-learning framework in order to distribute, administrate, navigate, document, report and manage e-learning for users and enterprises with different needs and strategies. The standards that eventually will be established will not only apply for e-learning content but also for learning management systems in the market.

E-learning is dependent on an LMS (or some kind of management system) for distribution and administration, but from a standardisation perspective e-learning should be independent of different types of LMS. E-learning should work without problems across different technological platforms. This will make the choice of learning technology, if it is for e-learning or LMS, independent of vendor. Hopefully, this will open the market for more vendors and give a higher degree of variation in learning technology and e-learning products.

As we see, the upcoming standards has an organisational dimension, where the intention is to manage large volumes of content and users in order to get more effective learning solutions without having to deal with technology problems. For large organisations like the US defence industry and the aviation industry, the standards will have an enormous effect on internal training for both implementation and administration. Anyway, the intention of the standardisation initiatives is not administration, but as ADL puts it: "(...) to ensure access to high-quality education, training and decision aiding ("mentoring") materials that can be tailored to individual learner needs and made available whenever and wherever they are required". (ADL 2001:1-11).

Technological standards and pedagogy

"It's a siren song few training professionals can resist: e-learning content that's free of proprietary confines and manageable as discrete building blocks that can be mass-customized for learners" (Barron 2000:1).

The standardisation initiatives have, as their primary goal, to increase access to learning material, training and education of high quality that can be tailored to actual needs. Standards do not imply anything directly about what kind of pedagogical approach to take when creating e-learning content, or what type of functionality a LMS should have. But most likely standards will have implications for how content and an LMS should be developed and work. To take this one step further, it could be argued that possible implications would set premises for what you could expect of high quality content in different competency areas.

Learning objects model

Sometimes you get the impression that working with industry standards for e-learning is just about technology. In articles and speeches on the subject you get to know that technological standards, and metadata specified by theses standards, in principle doesn't have anything to do with the content. The metadata is only a reflection of the actual content (REN 2002).

To retrieve, reuse and blend different learning objects are some of the main goals of the standardisation work. A presupposition to realise this goal is to structure and tag the content according to a standard. For example the content must be structured in such a way that each "module" is an independent unit, which is expressed through a set of metadata. This opens up the possibility of mixing different e-learning units and put them together for new purposes and in new learning tracks.

Today's prominent standardisation work is based on a model called the learning object model or object-oriented design (Barron 2000, Koper 2001, Downes 2001, Longmire 2000). The fundamental idea behind this model is that learning content can be split up and put back together in

new learning tracks/courses in the same way you play with blocks of LEGO™.

This model belongs to a systematic and prescriptive approach to pedagogical design. The approach has its parents in behaviouristic psychology and systems engineering (Molenda 1997). According to Gress & Purpel (1988) most of the American research and literature on pedagogical design comes from this approach. Theoreticians that are known for work in this field are among others Franklin Bobbit, Ralph W. Tyler, Taba, Gagnè & Briggs, Weinstein & Fannini, Robinson, Ross & White, Dick & Carey.

The systematic approach to the pedagogical field is one among several approaches. Other approaches go under names and terms such as dialectical, dynamic, evolutional, hermeneutical, and constructivistic. Common for all these approaches to pedagogical design is that they are critical to a systematic approach and the use of prescriptive and linear models on all kinds of competency areas. It is believed that there are areas of competence where prescriptive and linear models are unsuitable for creating useful and effective learning experiences. For more complex learning experiences, they are regarded as too static.

As was said earlier, metadata and the course structure are said to have no implications for the content of the course. An important question when you look at standards in relation to pedagogy is if structure and content can be separated? Could structure and content be treated separately without consequences for each other? Could this be a misunderstood theoretical approach that would be impossible to implement in reality? Will a predefined course structure set important premises for pedagogical design of e-learning?

If you look at these questions in the light of the learning object model, the distinction between content and structure are unproblematic. In such a pedagogical approach the structure would be predefined independent of the content. But if you look at the question in the light of, for instance, a dialectical approach, content and structure would evolve in interaction with each other. The structure could not be predefined because it is decided on in relation to the content.

Rob Koper from The Open University of the Netherlands, is one of few who work with issues of standardisation in a pedagogical perspective. He has taken another pedagogical approach to the standardisation work other than the learning object model, and is contributing constructively to include another pedagogical perspective in the standards. In his article "Modelling units of study from a pedagogical perspective" (2001) he directs a critical question to the concept of learning in the learning object model. As it has been pointed out earlier in this article, the learning object model takes for granted that you can split and put together learning units to create new learning tracks. Koper (2001) means that such an approach is too simple, especially when more complex learning

processes are needed. In his article he takes on a situated learning approach described by Lave & Wenger (1991). According to this approach's learning concept, learning is an activity that takes place in a sociocultural context. Learning will thus depend on this context.

In Kopers (2001) analysis of the way the learning object model were used in the standardisation work, he found that how these learning objects would be used in context, was not accounted for. In other words he found a lack a framework. Koper writes: " The learning object model expresses a common overall structure of objects within the context of a unit of study, but does not provide a model to express the semantic relationship between the different types of objects in the context of use in an educational setting" (Koper 2001:5).

Kopers intention is not to say that the standardisation initiatives only will do for simple learning processes. What he tries to accomplish is to set focus on the need to develop a meta-model that includes the description of the learning objects in a semantic context.

The relationship between technology and pedagogy

There is good reason to question the idea that a single model for pedagogical design is enough to be used in all areas of competence. If the technological standards limit variation in pedagogical approaches, the use of e-learning for training and education will also be limited.

A relevant question in this matter is where possible limitations exist. Is ity in the technology or in the chosen pedagogical approach? Because people with a technological background dominate the standardisation work there is reason to ask, without the intention of being rude, if they have the necessary knowledge about pedagogical design and learning to include different pedagogical approaches in the work. If they don't know the field of pedagogy they would probably use their own models and methods when designing e-learning, which in this case is similar to object oriented design and the notion of learning objects. Fuhua Lin, who criticise the way learning objects is used and written about, expresses it like this: "The LO model reinforces the notion that course development now needs to follow a systems development life cycle. It is quite clear that courses are more than a collection of learning objects" (Lin 2001:2).

If it is so the that ideas and thoughts of people working with standards sets the premises for pedagogical variation and quality in e-learning, standardisation work should actualise *the relationship between technology and pedagogy*. Because the technologists today have come far in the work with industry standards for e-learning, it is very important that pedagogues start to engage in the work. This is order to broaden the perspectives, and to get the necessary acceptance in the pedagogical communities, that eventually will be using these standards.

Flexibility or rigidity in e-learning?

Standards for e-learning technology are created in order to make technology and market more flexible and open. This is indisputable a good intention. But will flexibility also be the case for pedagogy and learning? Because today's standardisation initiatives base their work on a single model for pedagogical design, the consequence could possible be rigidity in pedagogy and learning. If this is the case, and it needs to be looked at in further detail, it gives rise to a new set of questions. One of them would be if standards make e-learning less suitable for different learning experiences, hence restricts a wide use and acceptance of e-learning.

It has not been the intention in this article to be negative towards the standardisation initiatives. The intention is to look at the complexity of the issue, and possible consequences today's standardisation work could have for pedagogy and learning. Hopefully, this article can contribute to an interesting debate in both technological and pedagogical communities of whom all are interested in a successful future for the e-learning industry.

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